| PCN | PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| 20340 | BRO-0009(044) | 1 | 37 |

# JOB # 2

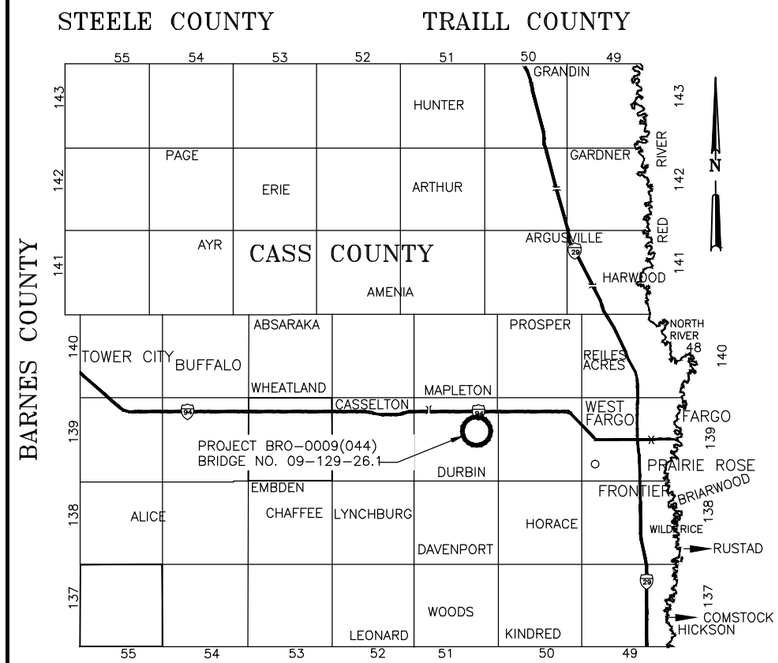
# CASS COUNTY HIGHWAY DEPARTMENT

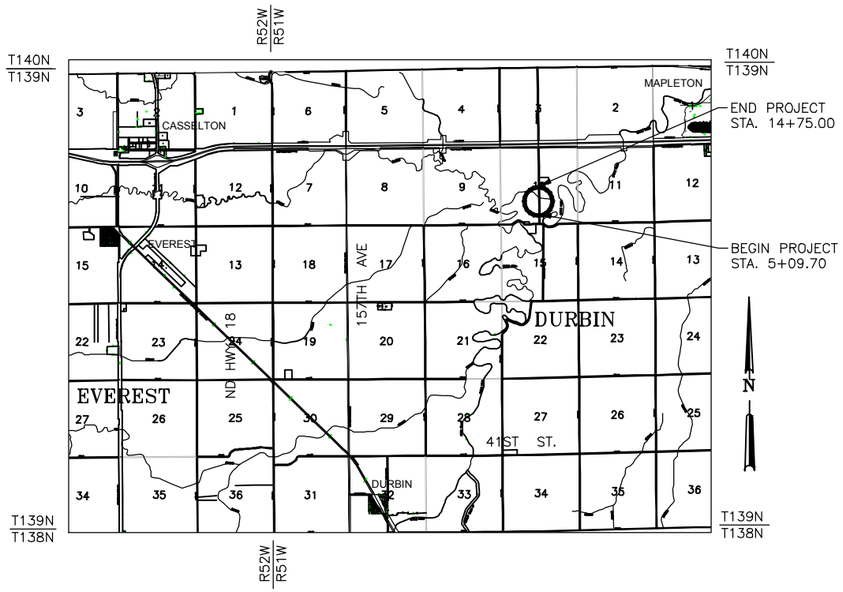
# PLANS

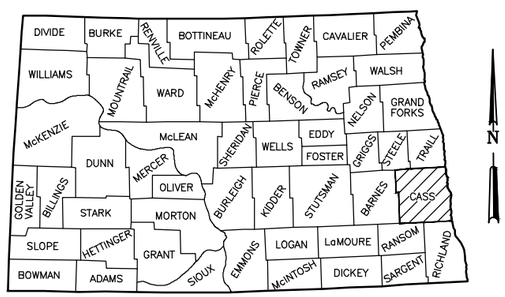
## FOR

## COUNTY PROJECT NO. BRO-0009(044)
## BRIDGE NO. 09-129-26.1

PROJECT CONSISTS OF CONSTRUCTION OF A 214'-8" LONG PRESTRESSED BOX BEAM BRIDGE WITH A CAST-IN-PLACE DECK ON 160 1/2 AVE SE, ROAD REALIGNMENT, GRADING, CHANNEL REPAIR & INCIDENTALS.




SKETCH MAP OF NORTH DAKOTA
SHOWING COUNTIES

GOVERNING SPECIFICATIONS:

STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION ADOPTED BY THE NORTH DAKOTA DEPARTMENT OF TRANSPORTATION, OCTOBER 2014: STANDARD DRAWINGS CURRENTLY IN EFFECT: AND OTHER CONTRACT PROVISIONS SUBMITTED HEREIN.

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## STANDARD DRAWINGS

| | |
|---|---|
| D-622-1 | PILE SPLICE DETAILS |
| D-704-7 | BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS PERFORATE TUBE |
| D-704-8 | BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS |
| D-704-13 | BARRICADE DETAILS AND CHANNELIZING DEVICES |
| D-704-14 | CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS |
| D-764-01 | W-BEAM GUARDRAIL - GENERAL DETAILS |
| D-764-05 | SEQUENTIAL KINKING TERMINAL |
| D-764-22 | TYPICAL GRADING AT BRIDGE ENDS WITH W-BEAM GUARDRAIL |

THE STANDARD DRAWINGS ARE INCLUDED IN THE BACK OF THE PLANS

## SPECIAL PROVISIONS

SP 0003(14) - TEMPORARY EROSION AND SEDIMENT BEST MANAGEMENT PRACTICES

SP 0004(14) - FEDERAL MIGRATORY BIRD TREATY ACT

SP 5044(014) - PERMITS AND ENVIRONMENTAL CONSIDERATIONS

LENGTH OF PROJECT = 0.183 MILES

SURVEY OCTOBER, 2013
DESIGN DECEMBER, 2014

**DESIGN DATA FOR BRIDGE 09-129-26.1**

| | | | | |
|---|---|---|---|---|
| Traffic | Average Daily | | | Max.Hr. |
| Current 2014 | Pass: <50 | Trucks: | Total: <50 | |
| Forecast 2034 | Pass: <50 | Trucks: | Total: <50 | |
| Clear Zone Distance: 14 FT | | Design Speed: 40 MPH | | |
| Minimum Sight Dist. for Stopping: 305 FT | | | | |
| Minimum Sight Dist. for Safe Passing: | | | | |
| Sight Dist. for No Passing Zone: 1,100 FT | | | | |
| Pavement Design Life (years) N/A | | | | |

APPROVED BY CASS COUNTY ENGINEER:

JASON BENSON /S/

JASON BENSON N.D. REG. NO.

DATE: FEBRUARY 20, 2015


Houston Engineering Inc.
Fargo
P: 701.237.5065
F: 701.237.5101


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| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 2 | 37 |

**NOTES:**

**100** **DESIGN DATA:**
HL-93 LOADING
INCLUDES 15 P.S.F. FOR FUTURE WEARING SURFACE
CLASS AE-3 CONCRETE - f'c = 3,000 P.S.I.
CLASS AAE-3 CONCRETE - f'c = 4,000 P.S.I.
REINFORCING STEEL (GRADE 60) - Fy = 60,000 P.S.I.

**100-P01** **INDIVIDUAL ITEMS:** THE COST OF THOSE ITEMS SHOWN ON PLANS BUT NOT LISTED IN THE ESTIMATE OF QUANTITIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR VARIOUS PAY ITEMS.

**100-P02** **WEED CONTROL:** SUCCESSFUL BIDDERS AS PART OF THEIR SUPPLY CONTRACT WILL BE REQUIRED AS PART OF THE BID ACCEPTANCE TO COMPLY WITH THE FOLLOWING:

1. ALL NOXIOUS WEEDS MUST BE CONTROLLED WITHIN THE PIT AND EXTRACTION AREA EACH YEAR IN COMPLIANCE WITH NORTH DAKOTA STATE AGRICULTURE DEPARTMENT RECOMMENDATIONS FOR NOXIOUS WEED CONTROL.
2. THE COUNTY WEED OFFICER SHALL INSPECT THE PIT AND EXTRACTION AREA BEFORE ANY MATERIALS SHALL BE REMOVED AND SHALL BY WRITTEN LETTER CERTIFY OPERATOR'S COMPLIANCE WITH THE NORTH DAKOTA DEPARTMENT OF AGRICULTURE'S RECOMMENDATIONS FOR NOXIOUS WEED CONTROL.
3. ANY QUESTIONS CONCERNING THE CERTIFICATIONS OF COMPLIANCE FOR NOXIOUS WEED CONTROL AND THE REQUIREMENTS THEREUNDER IS AVAILABLE FROM THE COUNTY WEED OFFICER AT (701) 298-2388.

**105-P01** **PLAN LOCATION:** PLAN LOCATIONS ARE APPROXIMATE. ACTUAL LOCATIONS SHALL BE VERIFIED BY THE CONTRACTOR.

**202-P01** **REMOVAL OF EXISTING STRUCTURE:** THE CONTRACTOR IS TO REMOVE THE EXISTING 149' 5 - SPAN TIMBER BRIDGE WITH WOOD DECK SUPPORTED BY STEEL H-PILE. WOODEN PILE FROM APPROXIMATELY 5 SUBSTRUCTURES OF A PREVIOUS BRIDGE ALSO REMAIN IN THE CHANNEL. THE CONTRACTOR WILL BE RESPONSIBLE FOR REMOVAL AND PROPER DISPOSAL OF ALL PORTIONS OF THE STRUCTURE. ALL EXISTING TIMBER AND STEEL PILING WITHIN THE RIGHT OF WAY SHALL BE REMOVED TO 2' BELOW FINAL GROUND ELEVATION. THE DISPOSAL SITE SHALL BE AT A LOCATION OFF SITE AND APPROVED BY THE ENGINEER.

THE EXISTING BRIDGE HAS A USGS METERING BOX. THE CONTRACTOR SHALL NOTIFY THE COUNTY 2 WEEKS PRIOR TO BRIDGE DEMOLITION FOR COORDINATION WITH USGS ON THE REMOVAL OF THE METERING BOX.

**203-P01** **SHRINKAGE:** 30 PERCENT ADDITIONAL VOLUME IS INCLUDED FOR SHRINKAGE IN EMBANKMENT QUANTITIES.

**203-P02** **EMBANKMENT:** EMBANKMENT QUANTITIES ARE LISTED FOR INFORMATIONAL PURPOSES ONLY. COSTS TO HAUL, PLACE AND COMPACT EMBANKMENT SHALL BE INCLUDED IN THE PRICE BID FOR "BORROW-EXCAVATION".

**203-P03** **EMBANKMENT CONSTRUCTION:** ALL CHANNEL AND ROADWAY EMBANKMENT SHALL BE COMPACTED TO THE REQUIREMENTS FOR COMPACTION CONTROL, TYPE C. CONSTRUCTION OF ALL EMBANKMENT SHALL BE BENCHED AT 4H:1V.

THE SUITABILITY OF THE MATERIAL FROM ON-SITE EXCAVATIONS FOR USE IN EMBANKMENTS WILL BE DETERMINED BY THE FIELD ENGINEER. IF MATERIAL IS NOT SUITABLE FOR THE ROADBED ITSELF, IT MAY BE USED ON SLOPE AREAS AS DETERMINED BY THE ENGINEER.

**203-P04** **COMPACTION AND DENSITY CONTROL:** SUB-SURFACE MATERIAL SHALL BE COMPACTED WITH A SHEEPS FOOT ROLLER.

MOISTURE AND DENSITY CONTROLS FOR CLAY MATERIALS SHALL BE IN ACCORDANCE WITH SECTION 203.04 E.2 OF THE STANDARD SPECIFICATIONS ND T-99 EXCEPT AS STATED BELOW. GRANULAR MATERIALS SHALL MEET ND T-180.

FILL MATERIAL SHALL BE SPREAD AND COMPACTED IN LOOSE LIFTS OF 4-8 INCHES. COMPACTION SHALL MEET THE FOLLOWING REQUIREMENTS:

| | RELATIVE COMPACTION, | MOISTURE CONTENT PERCENT (ASTM D 698 |
|---|---|---|
| VARIANCE FROM OPTIMUM, | | |
| REFERENCE | STANDARD PROCTOR) | PERCENTAGE POINTS |
| GRANULAR MATERIALS | ≥ 95 | SANDS (+/- 3) |
| CLAY MATERIALS | ≥ 95 | CLAYS (-1 TO +3) |

ALL COSTS ASSOCIATED WITH SUBGRADE COMPACTION SHALL BE INCLUDED IN THE PRICE BID FOR OTHER ITEMS.

**203-P05** **EXCAVATION AND FILL ELEVATIONS:** ALL DITCH GRADES AND CONTOURS ARE GIVEN AT THE TOP OF THE TOPSOIL. A FINISHED GROUND SURFACE FOR GRADING IS AVAILABLE UPON REQUEST.

**203-P06** **BORROW:** ALL BORROW SHALL BE CONTRACTOR FURNISHED BORROW PER NDDOT STANDARD SPECIFICATIONS.

**203-P07** **TOPSOIL:** ALL DISTURBED EMBANKMENT AREAS SHALL REQUIRE REMOVAL AND REPLACEMENT OF THE TOPSOIL (QUANTITY ESTIMATED AT 4").

**210-P01** **CHANNEL EXCAVATION:** THE TYPICAL CHANNEL CROSS-SECTION IS TO EXTEND 50 FEET EITHER SIDE OF THE BRIDGE CENTERLINE AND TRANSITION TO MEET EXISTING GRADE AT 100 FEET FROM CENTERLINE. EXISTING ELEVATIONS WILL BE MAINTAINED AND EXTENDED AS NEEDED TO CONNECT TO GRADES AT WING WALLS. ITEM SHALL BE INCLUDED IN THE BID PRICE FOR "CHANNEL EXCAVATION." DISPOSAL OF EXCESS EXCAVATED OR WASTE MATERIALS SHALL BE IN AREAS ARRANGED BY THE COUNTY. THE DISPOSAL SITE SHALL BE ROUGH GRADED AS DIRECTED BY THE ENGINEER. 1,800 CY HAS BEEN APPROXIMATED FOR CHANNEL EXCAVATION. NO ADJUSTMENT WILL BE MADE FOR VARIATION IN QUANTITY.

**210-P02** **FOUNDATION PREPARATION:** ROOTS OR OTHER VEGETATION MORE THAN 1" IN THICKNESS BELOW THE FINISHED SURFACE OF EXCAVATED SECTIONS SHALL BE REMOVED TO A DEPTH OF 6" BELOW THE FINISHED SURFACE.

**210-P03** **CLASS 1 EXCAVATION:** EXCAVATION SHALL EXTEND FROM THE BOTTOM OF THE FOOTING TO THE UPPER LIMITS AS SHOWN ON THE BRIDGE LAYOUT SHEET AT THE ABUTMENTS. EXCAVATION IS ABOVE THE DATUM LINE OF 903.00.

**210-P04** **CLASS 2 EXCAVATION:** EXCAVATION SHALL EXTEND FROM THE BOTTOM OF THE FOOTING TO THE UPPER LIMITS AS SHOWN ON THE BRIDGE LAYOUT SHEET AT THE PIERS. EXCAVATION IS BELOW THE DATUM LINE OF 903.00.

**230-P01** **SCARIFYING AND RECOMPACTION OF EMBANKMENT AREAS:** SUBGRADE TYPE A - 12IN SHALL BE UTILIZED UNDER ALL EMBANKMENT AREAS. THIS WORK SHALL BE INCLUDED IN THE BID ITEM FOR "BORROW-EXCAVATION." ALL AREAS UNDER THE ROADWAY SHALL BE COMPACTED BEFORE PLACEMENT OF AGGREGATE SURFACING.

**251-P01** **SEEDING:** CONTRACTOR WILL SEED AND MULCH AREAS DISTURBED BY CONSTRUCTION ACTIVITY. CONTRACTOR SHALL PROVIDE EROSION CHECKS UNTIL TURF IS ESTABLISHED AS DIRECTED BY THE ENGINEER IN THE FIELD.

SEEDING - CLASS III SHALL BE USED AS SHOWN IN THE TURF ESTABLISHMENT AND EROSION CONTROL PLANS. THE SEED MIXTURE FOR ALL AREAS EXCEPT THOSE DESIGNATED AS URBAN SHALL BE AS FOLLOWS:

| CLASS III | PERCENT OF LIVE SEEDS PER ACRE |
|---|---|
| MEADOW BROMEGRASS | 25% |
| INTERMEDIATE WHEATGRASS | 25% |
| CRESTED WHEATGRASS | 25% |
| TETRAPLOID INT. RYEGRASS | 10% |
| CREEPING ALFALFA | 15% |

80 LBS OF SEED AND 20 LBS OF RYE PER ACRE.

ALL AREAS DESIGNATED AS SEEDING - CLASS III (URBAN) IN THE TURF ESTABLISHMENT AND EROSION CONTROL PLANS SHALL BE AS FOLLOWS:

| CLASS III | POUNDS OF PURE LIVE SEED PER ACRE |
|---|---|
| BLUEGRASS (2 KINDS) | 120 |
| CREEPIN RED FESCUE | 20 |
| PERENNIAL RYE | 20 |
| TOTAL | 160 |

FERTILIZER SHALL BE A MIXTURE OF 5-10-5 APPLIED AT THE RATE OF 100 LBS PER ACRE. ALL COST FOR LABOR, EQUIPMENT, AND MATERIALS NECESSARY TO COMPLETE THIS WORK SHALL BE INCLUDED IN THE UNIT PRICE BID FOR "SEEDING-CLASS III."

**256-P01** **LOOSE ROCK RIPRAP:** EXACT PLACEMENT LIMITS SHALL BE DETERMINED BY THE ENGINEER IN THE FIELD.

**602-P01** **END BEAMS AND PIER DIAPHRAGMS:** END BEAM AND PIER DIAPHRAGM CONCRETE SHALL BE PLACED AT THE SAME TIME AS THE DECK.

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09–129–26.1
NOTES
PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 3 | 37 |

**NOTES:**

**602-P02** **CONCRETE:** ALL SUPERSTRUCTURE CONCRETE SHALL BE CLASS AAE-3 CONCRETE.

CONCRETE FOR ABUTMENTS AND PIERS SHALL BE CLASS AE-3 CONCRETE.

SURFACE FINISH "D" WILL BE REQUIRED FOR ALL EXPOSED WING SURFACES OR OTHER SURFACES THAT ARE VISIBLE TO THE MOTORING PUBLIC. SURFACE FINISH "C" WILL BE REQUIRED ON THE REMAINDER OF PIERS, ABUTMENTS, AND EDGE OF DECK.

BEAMS AND GIRDERS HAVE SLIGHT VARIATIONS IN THE ANTICIPATED CAMBER. TO BUILD THE DECK TO THE DESIGNATED THICKNESS WILL REQUIRE SLIGHT ADJUSTMENTS IN DECK ELEVATION AND/OR RISER DIMENSIONS. THESE ADJUSTMENTS RESULT IN MINOR CONCRETE QUANTITY DISCREPANCIES. THE CONTRACTOR SHALL CONSIDER THE QUANTITY DISCREPANCY WHEN HE/SHE BIDS THE UNIT PRICE FOR SUPERSTRUCTURE CONCRETE.

IF THE DEPTH OF THE CONCRETE RISERS BETWEEN THE TOPS OF THE GIRDERS AND THE BOTTOM OF THE DECK SLAB EXCEEDS THE THEORETICAL DIMENSIONS, THE ADDITIONAL CONCRETE SHALL BE CONSIDERED INCIDENTAL.

DEFLECTION OF THE DECK SHORING SHALL BE COMPUTED USING THE TOTAL DEAD LOAD PLUS THE WEIGHT OF THE FINISHING MACHINE. THE FORMING SHALL BE ADJUSTED PROPERLY TO ACCOMMODATE THE DEFLECTION AND THEREBY MAINTAIN THE TOTAL SLAB THICKNESS SPECIFIED IN THE PLANS.

THE COST OF FURNISHING AND PLACING CONCRETE INSERTS, TIE WIRE, BAR SPACERS, BAR SUPPORTS, AND OTHER MISCELLANEOUS ITEMS SHALL BE INCLUDED IN THE PRICE BID FOR CLASS AE-3 CONCRETE OR CLASS AAE-3 CONCRETE.

**612-P01** **REINFORCING STEEL:** ALL REINFORCING STEEL SHALL BE GRADE 60. BARS ENDING WITH THE SUFFIX "E" SHALL BE EPOXY COATED. BARS ENDING WITH THE SUFFIX "S" INDICATE A SERIES.

DIMENSIONS FOR REINFORCING STEEL BARS ARE GIVEN AS OUT TO OUT UNLESS OTHERWISE NOTED.

THE FIRST DIGIT OR THE FIRST TWO DIGITS OF EACH BAR INDICATES THE BAR SIZE.

**616-P01** **STRUCTURAL STEEL:** STRUCTURAL STEEL SHALL BE AASHTO M 270, GRADE 36, EXCEPT THE REQUIREMENTS FOR CHARPY V-NOTCH TEST IS WAIVED FOR THE ICE NOSE AND ARMOR ANGLE. THE ICE NOSE AND ARMOR ANGLE SHALL BE GALVANIZED ACCORDING TO AASHTO M 111.

**616-P02** **WORKING DRAWINGS:** WORKING DRAWINGS, INCLUDING THOSE FOR THE PRESTRESSED BOX BEAMS, METAL PROTECTION ANGLE AND METAL ICE NOSE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

**622-P01** **PILING:** THE CONTRACTOR WILL CHECK TO SEE IF EXISTING PILING OR SPREAD FOOTINGS WILL INTERFERE WITH PILING TO BE DRIVEN. IF AN INTERFERENCE WILL RESULT, THEN IT MAY REQUIRE THE RESPACING OF PILING AS DETERMINED BY THE ENGINEER IN THE FIELD AND ENGINEERING FIRM.

PILING SHALL BE DRIVEN WITH A STEAM, AIR, OR DIESEL HAMMER WITH A RATED ENERGY AND RAM WEIGHT NOT LESS THAN 28,869 FOOT-POUND-TONS, AS COMPUTED BY THE FORMULA W(E - 14,014) + 0.412E WHERE W IS THE WEIGHT OF THE RAM IN TONS, AND E IS THE RATED HAMMER ENERGY. IN NO CASE SHALL THE RAM WEIGHT BE LESS THAN 3,300 POUNDS.

PILE TIPS SHALL BE REQUIRED FOR ALL PILE.

**704-P01** **DETOUR:** THE BRIDGE SHALL BE CLOSED DURING CONSTRUCTION. NO OFFICIAL DETOUR SHALL BE MARKED. TEMPORARY LOCAL ACCESS SHALL BE MAINTAINED AT ALL TIMES.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE ROADWAY AND DRIVEWAYS SO THAT THEY REMAIN ACCESSIBLE TO LOCAL RESIDENTS AND EMERGENCY VEHICLES AT ALL TIMES DURING CONSTRUCTION.

**754-P01** **SIGNS AND DELINEATORS:** ANY EXISTING SIGNS AND DELINEATOR POSTS SHALL BE REMOVED AND RESET BY THE CONTRACTOR. THIS ITEM OF WORK IS NOT A SEPARATE PAY ITEM BUT IS INCIDENTAL TO OTHER ITEMS.

**764-P01** **GUARDRAIL:** THE GUARDRAIL CONNECTION TO THE CONCRETE BARRIER AT THE BRIDGE ENDS SHALL BE INCLUDED IN THE BID FOR W-BEAM GUARDRAIL.

ENVIRONMENTAL COMMITMENTS

COMMITMENT NO. 1: ACTIVE MIGRATORY BIRD NESTS WITH EGGS OR CHICKS ARE PROTECTED BY THE FEDERAL MIGRATORY BIRD TREATY ACT. DEMOLITION ON BRIDGES OR BOX CULVERTS WITH ACTIVE NESTING CAN NOT START UNTIL NESTING SEASON IS OVER UNLESS MEASURES ARE TAKEN TO PREVENT NESTING.

ACTION TAKEN/REQUIRED: THE CONTRACTOR SHALL NOT REMOVE ANY EXISTING BRIDGE OR BOX CULVERT IF ACTIVE NESTS ARE PRESENT. THE CONTRACTOR CAN LEGALLY REMOVE INACTIVE NESTS PRIOR TO THE NESTING SEASON. AFTER INACTIVE NESTS ARE REMOVED THE CONTRACTOR CAN USE NETS OR TARPS SECURED TO THE STRUCTURE TO DISCOURAGE NESTING. PLEASE ALSO REFER TO THE BRIDGE NOTE SECTION OF THE PLANS.

COMMITMENT NO. 2: NO CONSTRUCTION OR DEMOLITION ACTIVITIES ARE TO TAKE PLACE IN THE MAPLE RIVER CHANNEL FROM APRIL 15 TO JUNE 1 UNLESS METHODS TO AVOID, MINIMIZE, OR MITIGATE IMPACTS TO FISH DURING MIGRATION/SPAWNING ARE INCORPORATED.

ACTION TAKEN/REQUIRED: THE CONTRACTOR WILL INSTALL FLOTATION SILT CURTAINS AROUND THE WORK AREAS IN ACCORDANCE WITH THE PLANS, PRIOR TO PERFORMING ANY WORK IN THE CHANNEL FROM APRIL 15 TO JUNE 1.

COMMITMENT NO. 3: TREE REMOVAL WILL BE REQUIRED TO COMPLETE THE PROJECT.

ACTION TAKEN/REQUIRED: THE COUNTY WILL MEASURE AND COUNT TREES REMOVED TO BE REPLANTED AT A 2:1 RATIO UNDER A SEPARATE PROJECT.

COMMITMENT NO. 4: UNAVOIDABLE IMPACTS TO WETLANDS WILL BE MITIGATED ADJACENT TO THE PROJECT.

ACTION TAKEN/REQUIRED: IMPACTS TO WETLANDS AND OTHER WATERS DOES NOT MEET THE CRITERIA FOR MITIGATION BY USACE OR EO 11990. NO ADDITIONAL PERMITS OR ENVIRONMENTAL COMMITMENTS HAVE BEEN IDENTIFIED BEYOND WHAT IS COVERED BY THE NDDOT'S STANDARD SPECIFICATION OF ROAD AND BRIDGE CONSTRUCTION.

**Other Waters Impact Table**

| Other Waters | | | | | | | | | | | Other Water Mitigation | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number | Location | Type | Size | | Feature | USACE Jurisdictional* | Impacts to Other Waters | | | | Mitigation Required | | | Location | Method |
| | | | Acres | Linear Feet | | | Acres | | Linear Feet | | EO 11990 | USACE | USFWS | | |
| | | | | | | | Temp | Perm | Temp | Perm | | | | | |
| OW1 | Sec.10, T139N, R51W | River | 0.07 | 50 | Natural | Yes | 0.05 | 0.09 | 120 | 120 | N | N | N | NA | NA |
| | | **Totals** | **0.07** | **50** | | | **0** | **0.09** | **120** | **120** | | | | | |

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09–129–26.1
NOTES
PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 4 | 37 |

BASIS OF ESTIMATE

| MATERIAL | BASIS OF ESTIMATE |
|---|---|
| SELECT BACKFILL | 1.875 TON/CY |
| AGGREGATE CL 13 | 1.875 TON/CY |
| SEEDING | ALL DISTURBED AREAS OUTSIDE OF ROADBED |
| TOPSOIL QUANTITY BASED ON 4" DEPTH | |
| WATER FOR COMPACTION | |
| EMBANKMENT | 10 GAL/CY |
| AGGREGATE CLASS 13 | 20 GAL/TON |
| ADDITIONAL INCLUDED AS DUST PALLIATIVE | 10 M GAL/MILE |
| EARTHWORK | QUANTITY |
| TOTAL EMBANKMENT* | = 2,878 CY |
| LOOSE VOLUME REQUIRED* | = 3,741 CY (BASED ON 130% COMPACTION) |
| COMMON EXCAVATION VOLUME | = 408 CY |
| CHANNEL EXCAVATION VOLUME | = 1,800 CY |
| USABLE MATERIAL FROM CHANNEL EXC. | = 450 CY (BASED ON 25% USABLE) |
| BORROW EXCAVATION REQUIRED (BORROW EXCAVATION) | = 2,883 CY |

*NOT A PAY ITEM (INCIDENTAL TO OTHER ITEMS)

**SUMMARY OF QUANTITIES**

| SPEC | CODE | DESCRIPTION | QUANTITY | UNIT |
|---|---|---|---|---|
| 103 | 0100 | CONTRACT BOND | 1 | L SUM |
| 201 | 0330 | CLEARING & GRUBBING | 1 | L SUM |
| 202 | 0104 | REMOVAL OF STRUCTURE | 1 | EA |
| 203 | 0101 | COMMON EXCAVATION-TYPE A | 408 | CY |
| 203 | 0109 | TOPSOIL | 764 | CY |
| 203 | 0140 | BORROW-EXCAVATION | 2,883 | CY |
| 210 | 0101 | CLASS I EXCAVATION (425 C.Y.) | 1 | L SUM |
| 210 | 0111 | CLASS 2 EXCAVATION (100 C.Y.) | 1 | L SUM |
| 210 | 0127 | CHANNEL EXCAVATION (1,800 C.Y.) | 1 | L SUM |
| 210 | 0209 | FOUNDATION FILL (P) | 650 | TON |
| 210 | 0411 | FOUNDATION PREPARATION | 1 | L SUM |
| 216 | 0100 | WATER | 59 | M GAL |
| 251 | 0300 | SEEDING CLASS III (P) | 1.42 | ACRE |
| 251 | 2000 | TEMPORARY COVER CROP (P) | 1.42 | ACRE |
| 253 | 0101 | STRAW MULCH | 2.84 | ACRE |
| 256 | 0200 | RIPRAP GRADE II | 681 | CY |
| 261 | 0112 | FIBER ROLLS 12IN | 2,902 | LF |
| 261 | 0113 | REMOVE FIBER ROLLS 12IN | 1,451 | LF |
| 262 | 0100 | FLOTATION SILT CURTAIN | 90 | LF |
| 262 | 0101 | REMOVE FLOTATION SILT CURTAIN | 90 | LF |
| 302 | 0356 | AGGREGATE SURFACE COURSE CL 13 | 961 | TON |
| 602 | 0130 | CLASS AAE-3 CONCRETE | 197.6 | CY |
| 602 | 1130 | CLASS AE-3 CONCRETE | 139.8 | CY |
| 602 | 1208 | CONCRETE BRIDGE BARRIER | 428.9 | LF |
| 602 | 1250 | PENETRATING WATER REPELLENT TREATMENT | 702.9 | SY |
| 604 | 9620 | PRESTRESSED BOX BEAM-33IN | 840.0 | LF |
| 612 | 0115 | REINFORCING STEEL-GRADE 60 | 12,396 | LBS |
| 612 | 0116 | REINFORCING STEEL-GRADE 60-EPOXY COATED | 42,100 | LBS |
| 616 | 5890 | STRUCTURAL STEEL | 1 | L SUM |
| 622 | 0012 | STEEL H-PILE TIPS 10 X 42 | 10 | EA |
| 622 | 0014 | STEEL H-PILING POINTS 12 X 53 | 14 | EA |
| 622 | 0020 | STEEL PILING HP 10 X 42 | 600 | LF |
| 622 | 0040 | STEEL PILING HP 12 X 53 | 770 | LF |
| 702 | 0100 | MOBILIZATION | 1 | L SUM |
| 704 | 1000 | TRAFFIC CONTROL SIGNS | 258 | UNIT |
| 704 | 1052 | TYPE III BARRICADE | 8 | EA |
| 714 | 3150 | HEADWALL - PRECAST CONCRETE 4IN | 2 | EA |
| 714 | 9720 | UNDERDRAIN PIPE PVC PERFORATED 4IN | 68 | LF |
| 714 | 9770 | UNDERDRAIN PIPE PVC NON-PERFORATED 4IN | 74 | LF |
| 764 | 0131 | W-BEAM GUARDRAIL | 208 | LF |
| 764 | 0145 | W-BEAM GUARDRAIL END TERMINAL | 4 | EA |

NOTES:
- WHERE A SPEC AND CODE ITEM DESCRIPTION IS FOLLOWED BY A (P), THE PLAN QUANTITY SHALL BE THE FINAL PAY QUANTITY.

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HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09–129–26.1
**BASIS OF ESTIMATE**
PROJECT NO. **BRO-0009(044)**
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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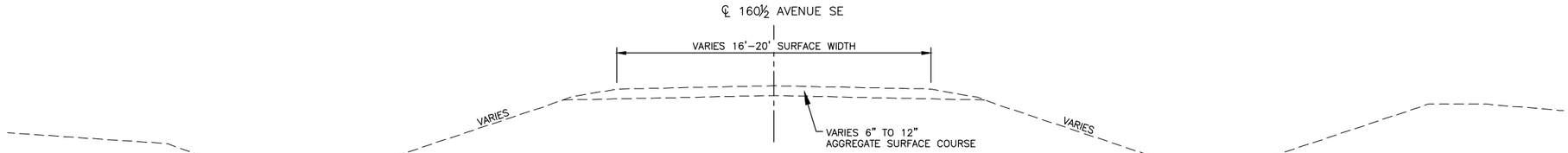
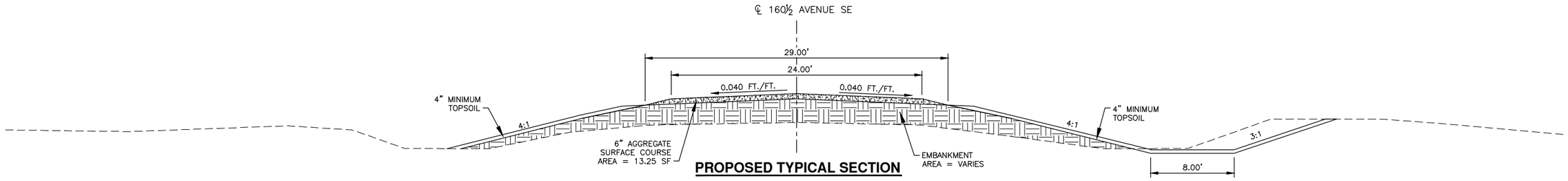
| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 5 | 37 |



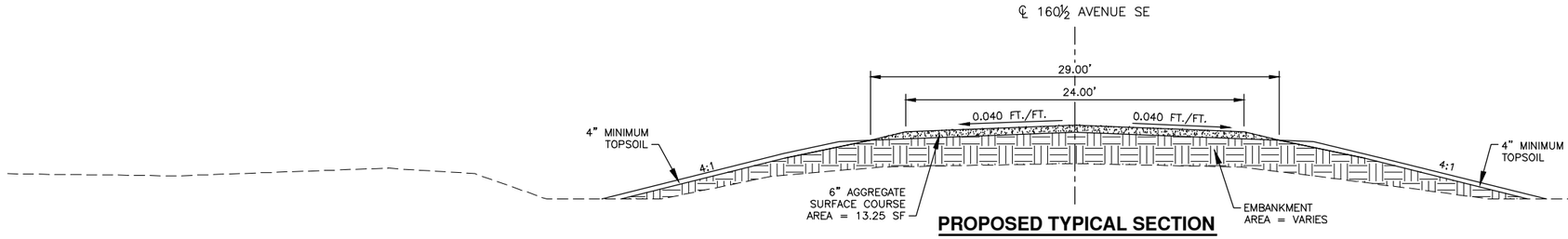

**EXISTING TYPICAL SECTION**

STA. 91+25.00 TO STA. 99+10.36
STA. 99+50.37 TO STA. 106+00.00




**PROPOSED TYPICAL SECTION**

STA. 5+63.57 TO STA. 9+70.89




**PROPOSED TYPICAL SECTION**

STA. 5+09.70 TO STA. 5+63.57
STA. 11+83.49 TO STA. 14+75.00

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09–129–26.1
# TYPICAL SECTIONS
PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

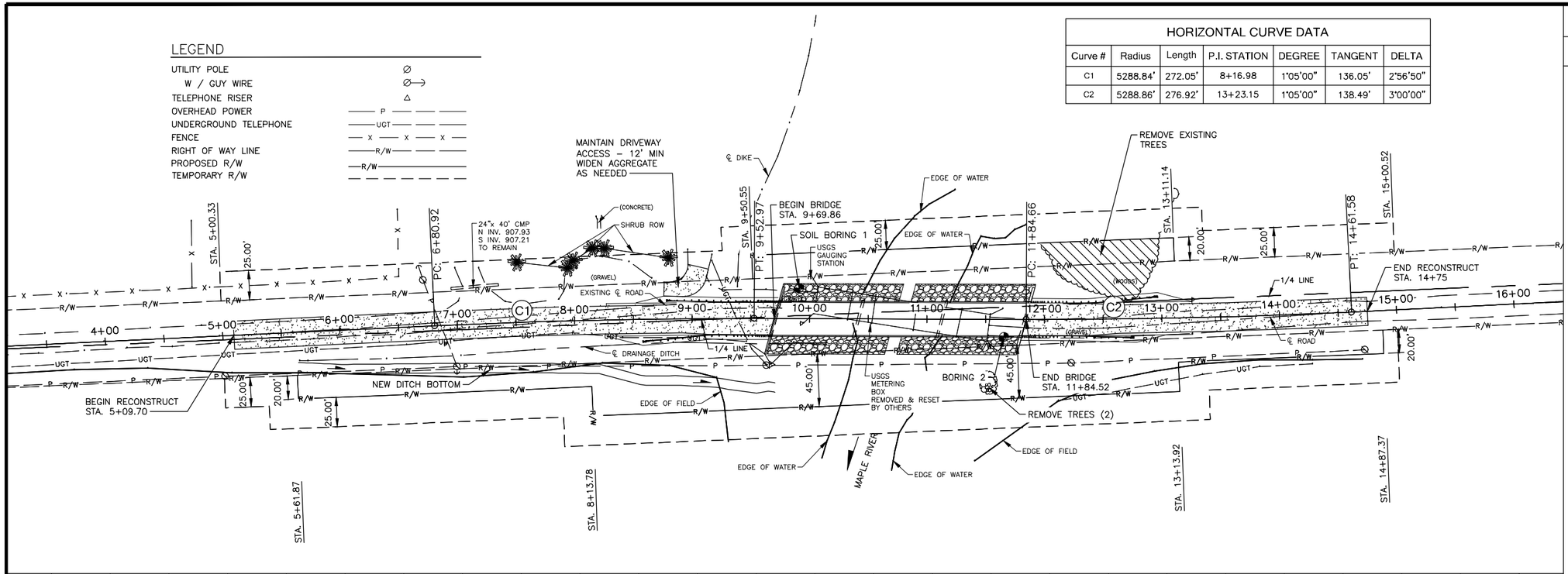
| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 6 | 37 |

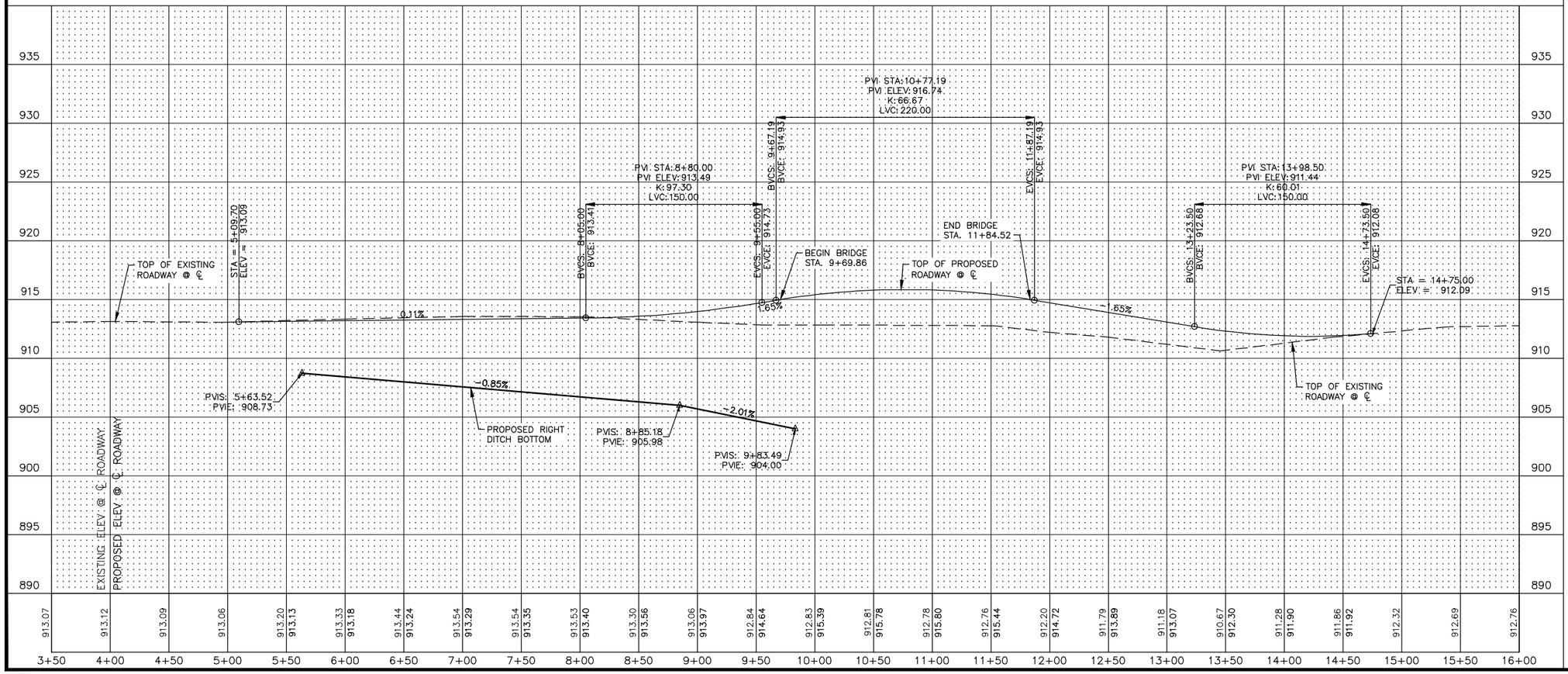
## LEGEND

- UTILITY POLE
- W / GUY WIRE
- TELEPHONE RISER
- OVERHEAD POWER
- UNDERGROUND TELEPHONE
- FENCE
- RIGHT OF WAY LINE
- PROPOSED R/W
- TEMPORARY R/W

## HORIZONTAL CURVE DATA

| Curve # | Radius | Length | P.I. STATION | DEGREE | TANGENT | DELTA |
|---|---|---|---|---|---|---|
| C1 | 5288.84' | 272.05' | 8+16.98 | 1°05'00" | 136.05' | 2°56'50" |
| C2 | 5288.86' | 276.92' | 13+23.15 | 1°05'00" | 138.49' | 3°00'00" |




NOTES:

1. EXISTING FENCE IN THE SW QUADRANT OF THE BRIDGE SHALL BE MAINTAINED. IF THE FENCE IS IMPACTED DURING CONSTRUCTION, THE CONTRACTOR SHALL REPAIR THE FENCE IMMEDIATELY. NO ADDITIONAL PAYMENT WILL BE MADE TO REPAIR THE FENCE.
2. THE CONTRACTOR SHALL NOT IMPACT THE EXISTING LINE OF PROTECTION DURING CONSTRUCTION. IF THE EXISTING LEVEE IS IMPACTED THE CONTRACTOR SHALL REPAIR THE LEVEE TO THE ELEVATION PRIOR TO CONSTRUCTION IMMEDIATELY. NO ADDITIONAL PAYMENT WILL BE MADE.
3. EXISTING TREES SHALL BE REMOVED TO THE RIGHT OF WAY LIMITS. ALL COSTS ASSOCIATED WITH TREE REMOVAL SHALL BE INCLUDED IN THE PRICE BID FOR "CLEARING & GRUBBING".

N

50 0 50 100
Scale Feet

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09–129–26.1
# ROAD PLAN AND PROFILE
PROJECT NO. **BRO-0009(044)**
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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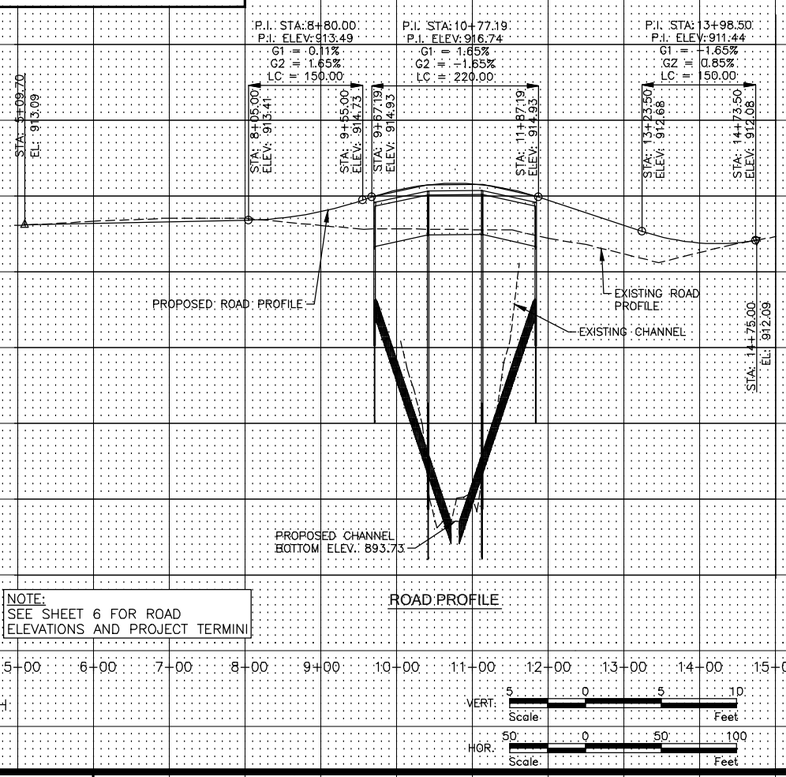
## CONTRACTED PROFILE

SCALES AS SHOWN



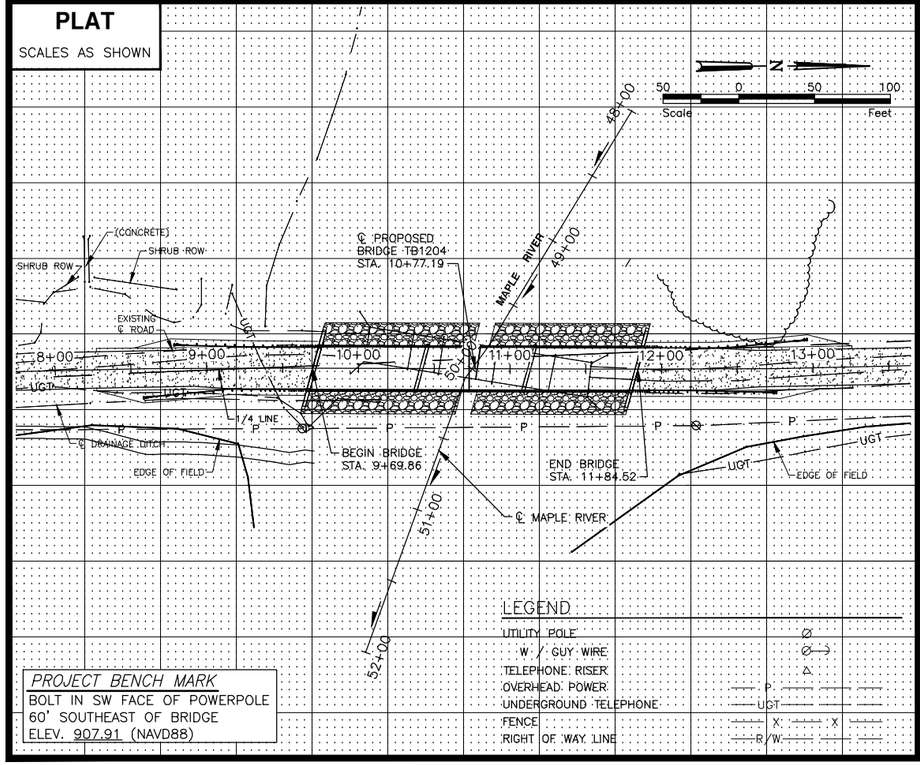

NOTE:
SEE SHEET 6 FOR ROAD ELEVATIONS AND PROJECT TERMINI

ROAD PROFILE




## PLAT

SCALES AS SHOWN



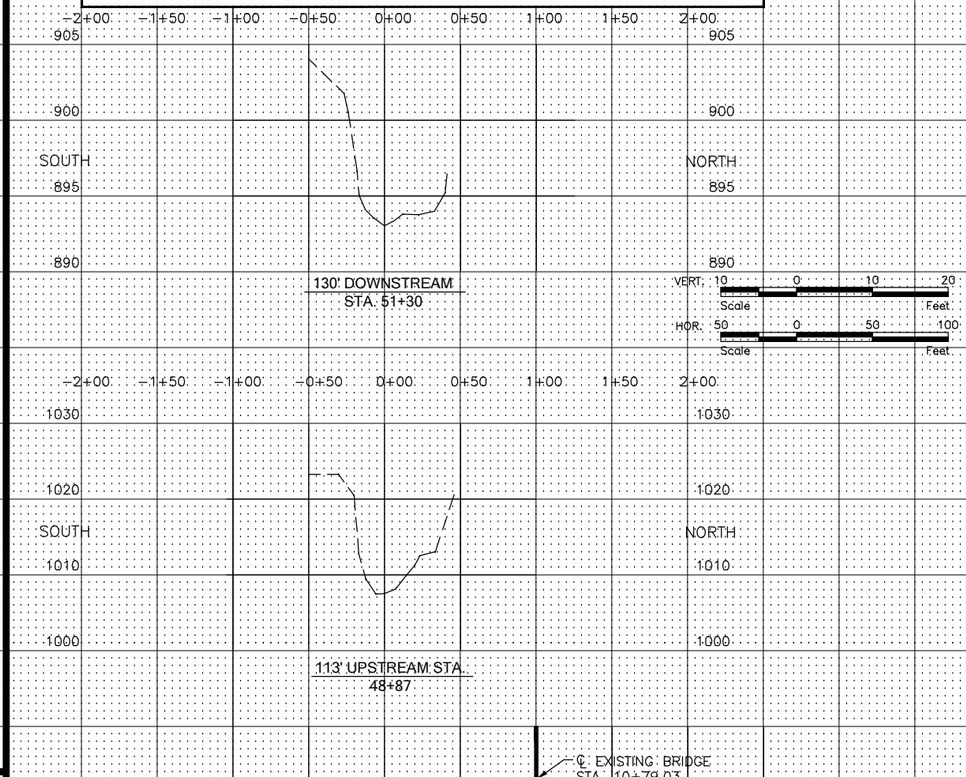

PROJECT BENCH MARK
BOLT IN SW FACE OF POWERPOLE
60' SOUTHEAST OF BRIDGE
ELEV. 907.91 (NAVD88)

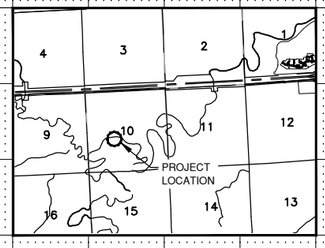
LEGEND

| | |
|---|---|
| UTILITY POLE | Ø |
| W / GUY WIRE | Ø→ |
| TELEPHONE RISER | Δ |
| OVERHEAD POWER | P |
| UNDERGROUND TELEPHONE | UGT |
| FENCE | X X |
| RIGHT OF WAY LINE | R/W |

## TYPICAL SECTIONS & PERTINENT DATA

SCALES AS SHOWN




VICINITY MAP

### LOCATION ENGINEER'S OBSERVATIONS AT BRIDGE SITE

1. Special Features: Waterfalls, dams, floods, ice, debris, sliding banks, recreational boating. LARGE OVERFLOW SECTION TO THE SOUTH
2. Other bridges or culverts over the same stream (particularly structures which carry highwater without overflow of roadway): Given locations, type, length, height above highwater, cross-sectional area, etc.
   APPROX. 1 MILE UPSTREAM, 115'L TWO-SPAN
   TOTAL WATERWAY AREA = 1000 SQ. FT.
   APPROX. 1.5 MILES DOWNSTREAM, 140'L THREE-SPAN
   TOTAL WATERWAY AREA = 1500 SQ. FT.
3. Apparent highwater elevation N/A Obtained from
4. Other data: Approx. velocity of water at time of survey N/A

### HYDRAULIC ENGINEER'S RECOMMENDATION

DATE OCT. 23, 2013

STREAM OR DITCH DESIGNATION MAPLE RIVER

DRAINAGE AREA 1,380 SQ. MILES

MAX FLOOD OF RECORD 2006 DESIGN FLOOD 15 YEAR

MAX OBSERVED HIGHWATER ELEVATION 910.83 DESIGN HIGH WATER 910.3

DESIGN MEAN VELOCITY THROUGH STRUCTURE 3.6 F.P.S.

LOW SUPERSTRUCTURE AT OR ABOVE ELEVATION 911.0

FLOWLINE ELEVATION 893.73 SKEW ANGLE 15 DEG.

WATERWAY AREA REQUIRED BELOW ELEVATION 911.0 = 2116 SQ. FT AT RIGHT ANGLES TO CHANNEL

IN THE INTEREST OF FLOOD PLAIN ZONING THE REGIONAL FLOOD (100 YR.) IS 11,800 C.F.S. AT STAGE 911.60 AND MEAN VELOCITY OF 5.0 F.P.S. WITH 0.4 FT. SWELLHEAD. THE ABOVE RECOMMENDATION WILL PROVIDE A STRUCTURE OF ADEQUATE WATERWAY TO PASS THE REGIONAL FLOOD WITHIN CRITERIA ESTABLISHED BY THE DEPARTMENT OF TRANSPOTATION.

### FOUNDATION ENGINEER'S RECOMMENDATION

DATE MAY 13, 2013

FROM MIDWEST TESTING LAB REPORT NO. M1135013 RECOMMEND THE PROPOSED BRIDGE BE SUPPORTED BY A DEEP PILE FOUNDATION SYSTEM, SUGGEST USING H-PILE DRIVEN TO REFUSAL IN THE HARD, SANDY, LEAN CLAYS OR VERY DENSE SILTY SAND DEPOSITS FIRST ENCOUNTERED AT DEPTHS OF APPROXIMATELY 48 TO 51 FEET BELOW EXISTING GRADE. ITS ESTIMATED THAT PILE WILL OBTAIN PRACTICAL REFUSAL UPON DRIVING TO DEPTHS OF APPROXIMATELY 60 TO 70 FEET BELOW EXISTING GRADE. DUE TO THE PRESENCE OF NUMEROUS COBBLES AND BOULDERS, RECOMMEND PILE TIPS BE PROVIDED FOR ALL PILE. RECOMMEND THE SLOPES OF THE CHANNEL BELOW THE BRIDGE BE 6.5H:1V.

Bridge survey sheets made from: HOUSTON ENGINEERING INC.

Bench mark elevation 907.91 (NAVD 1988)
Location: BOLT IN SW FACE OF POWERPOLE SE OF EXISTING BRIDGE

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NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

## BRIDGE SURVEY

OVER MAPLE RIVER
(T.H., C.S.A.H., C.R. etc.)

PROPOSED BRIDGE LOCATED
2.5 MILES SW OF MAPLETON

SEC. 10 TWP. 127N R. 45 W

TOWNSHIP DURBIN COUNTY CASS

**BRIDGE NO. 09-129-26.1**

**PROJECT NO. BRO-0009(044)**

**Sheet No. 7 of 37 Sheets**

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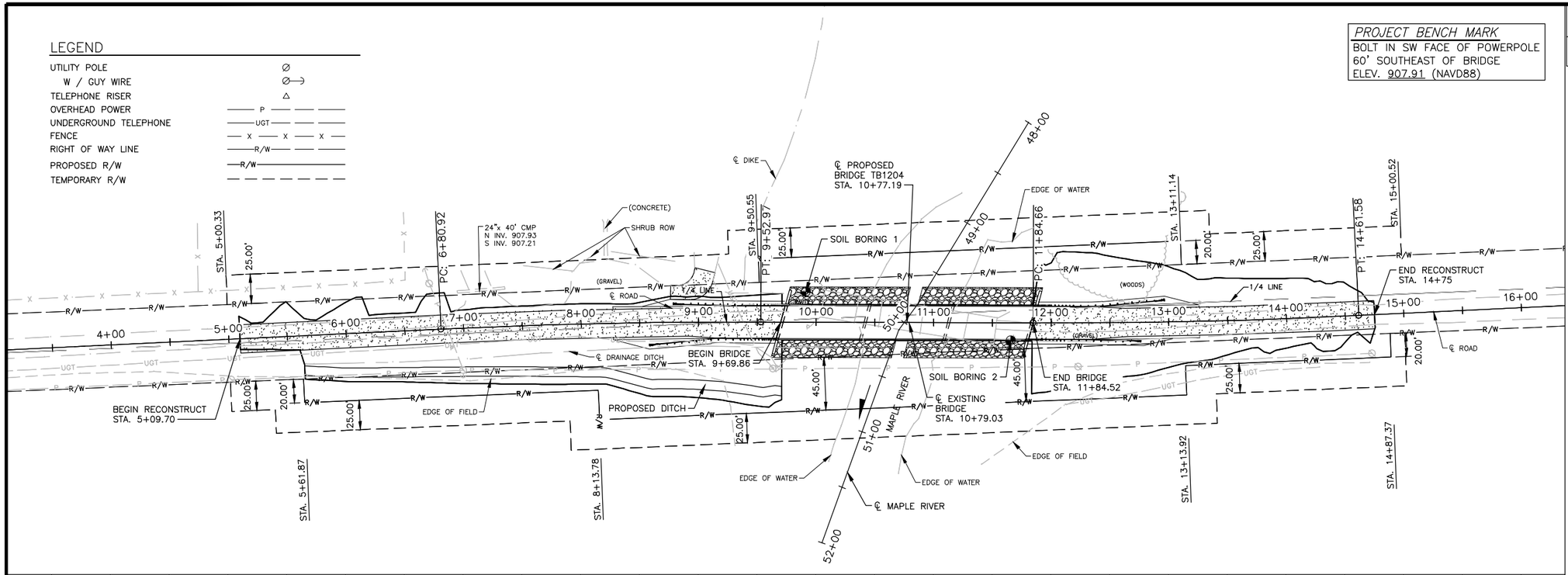
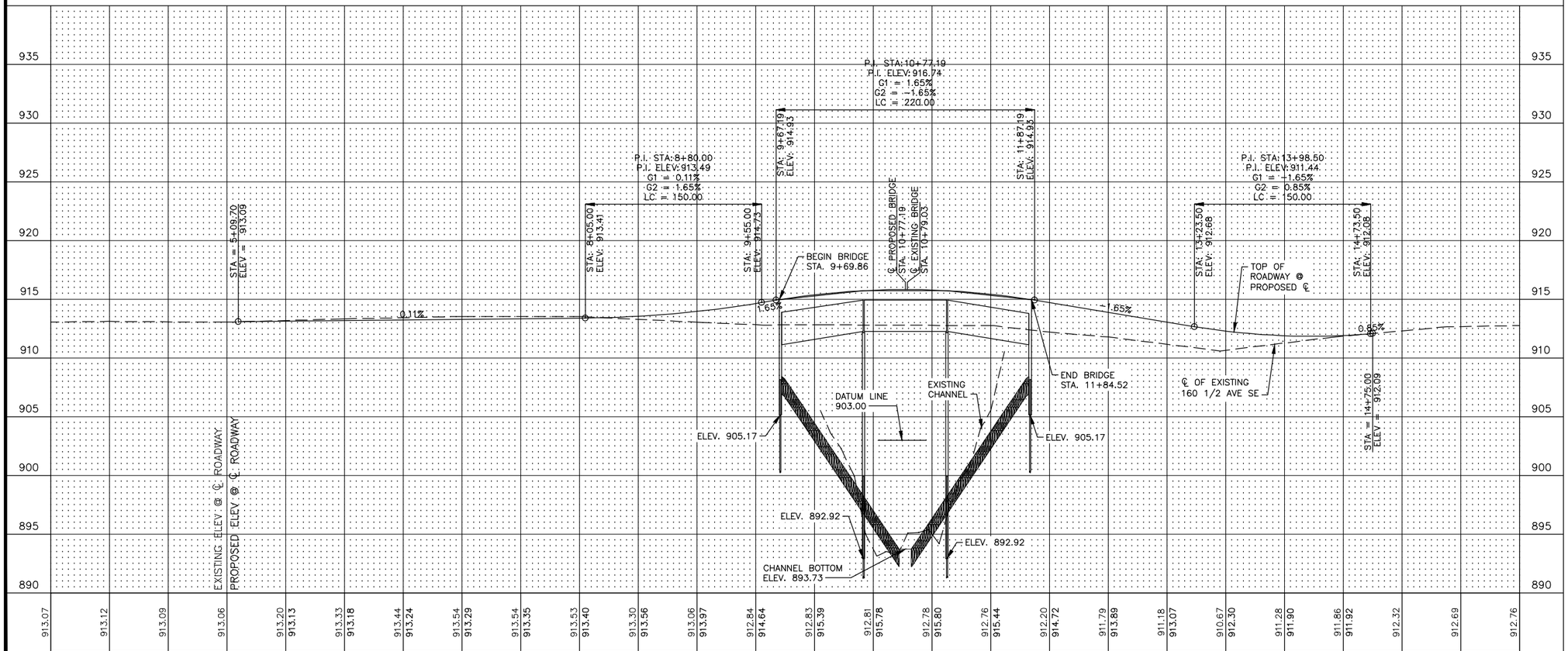
| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 8 | 37 |

*PROJECT BENCH MARK*
BOLT IN SW FACE OF POWERPOLE
60' SOUTHEAST OF BRIDGE
ELEV. 907.91 (NAVD88)

LEGEND

- UTILITY POLE
- W / GUY WIRE
- TELEPHONE RISER
- OVERHEAD POWER
- UNDERGROUND TELEPHONE
- FENCE
- RIGHT OF WAY LINE
- PROPOSED R/W
- TEMPORARY R/W




50 0 50 100
Scale Feet

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09-129-26.1
# BRIDGE PLAN AND PROFILE
PROJECT NO. **BRO-0009(044)**
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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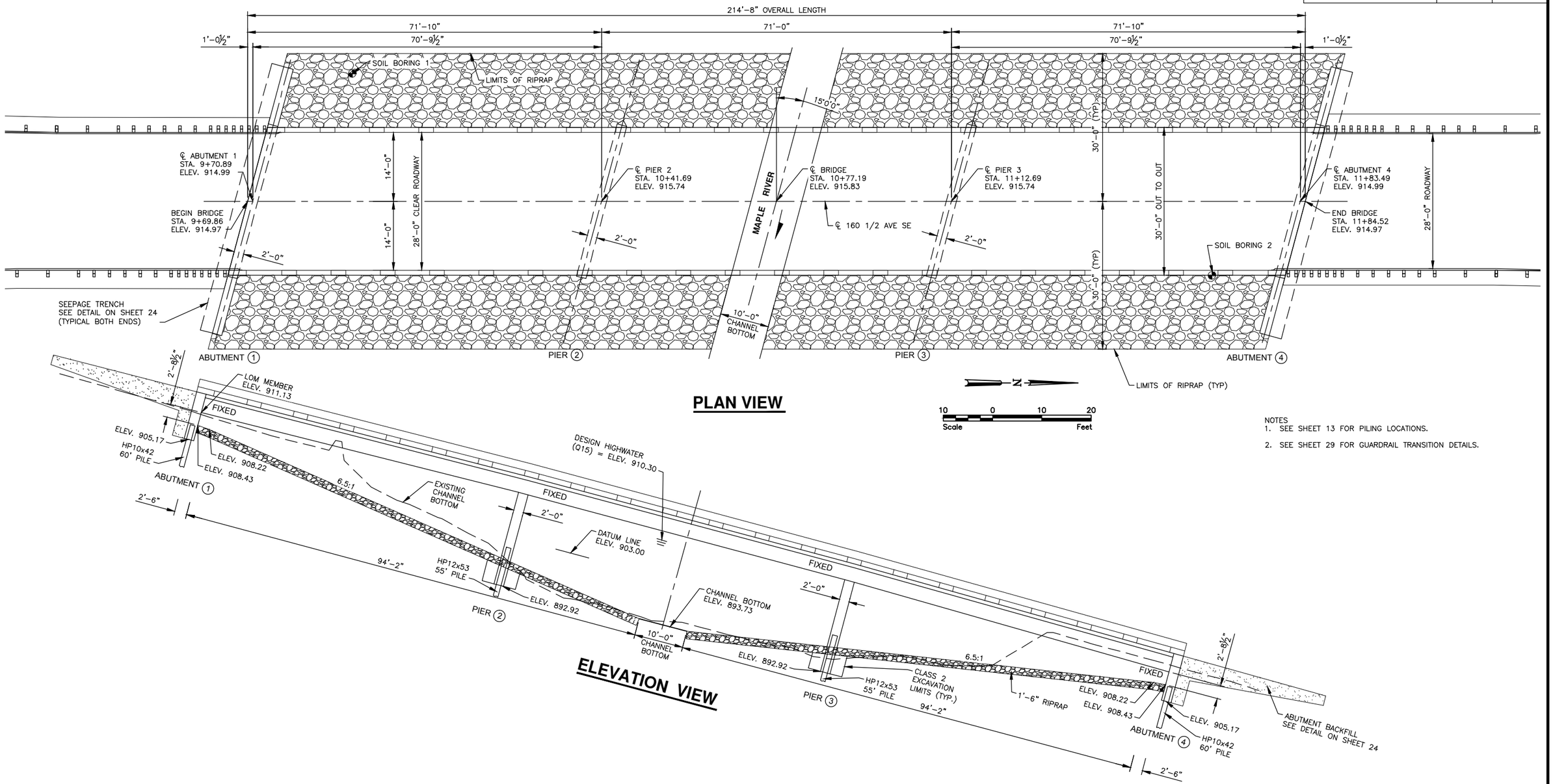
| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 9 | 37 |




## PLAN VIEW




## ELEVATION VIEW

NOTES
1. SEE SHEET 13 FOR PILING LOCATIONS.
2. SEE SHEET 29 FOR GUARDRAIL TRANSITION DETAILS.

## HYDRAULIC DESIGN DATA

| | |
|---|---|
| DRAINAGE AREA | 1380 MI² |
| 15 YR DESIGN DISCHARGE | 7,150 |
| STREAM GRADIENT | 0.025% |
| 15 YR DESIGN STAGE | 910.30 |
| 15 YR STREAM VELOCITY AT BRIDGE | 3.60 FPS |
| 50 YR DESIGN DISCHARGE | 9,900 CFS |
| 50 YR FLOOD STAGE | 911.20 |
| 50 YR VELOCITY | 4.50 FPS |

## GIRDER DATA

| LENGTH "L" | SPACE BETWEEN BEAMS | THICKNESS OF SLAB BETW. BMS | THICKNESS OF SLAB ON TOP BMS | BOX BEAM DEPTH | LIVE LOAD | FINAL STRESSING FORCE AT MIDSPAN | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | A | KIPS | A | KIPS | A | KIPS | WEIGHT TONS |
| 70'-0" | 8'-3" | 8" | 9" | 33" | HL-93 | 2.25 | 789.3 | 2.50 | 798.6 | 2.75 | 808.1 | 22.7 |
| DETENSIONING STRENGTH 6,000 PSI | | | | | | ACCEPTANCE STRENGTH 6,500 PSI | | | | | | |

## BENCH MARKS

| NO. | DESCRIPTION | LOC. | ELEV. |
|---|---|---|---|
| 1 | BOLT IN SW FACE OF POWERPOLE | 60' SE OF EXISTING BRIDGE | 907.91' |

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09-129-26.1
**BRIDGE LAYOUT**
PROJECT NO. **BRO-0009(044)**
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 10 | 37 |

# BORING LOG NO. B-1

Page 1 of 2

**PROJECT:** Proposed Bridge Replacement No. 09-129-26.1
**CLIENT:** Cass County Commission Fargo, North Dakota
**SITE:** Durbin Township Cass County, North Dakota

LOCATION See Exhibit A-2
Latitude: 46.86641° Longitude: -97.10587°
Surface Elev.: 99.5 (Ft.)

| DEPTH | ELEVATION (Ft.) | Description | RECOVERY (In.) | FIELD TEST RESULTS | LABORATORY TORVANE/HP (psf) | UNCONFINED COMPRESSIVE STRENGTH (psf) | WATER CONTENT (%) | DRY UNIT WEIGHT (pcf) | ATTERBERG LIMITS LL-PL-PI |
|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 98.5 | **FILL - SAND AND GRAVEL**, brown, frozen | | | | | | | |
| | | **FILL - FAT CLAY AND TOPSOIL MIXTURE**, brown and black, medium stiff to stiff, frozen to 3.5' | | | | | | | |
| | | | 6 | 8-3-4 N=7 | | | | | |
| | | | 6 | 3-4-5 N=9 | | | | | |
| | | | 6 | 3-4-4 N=8 | | | | | |
| 12.0 | 87.5 | **FAT CLAY (CH)**, grayish brown to brown, stiff | 10 | 5-5-7 N=12 | 3000 (HP) | | 33 | | |
| | | | 9 | | | 3480 | 34 | 87 | |
| | | | 12 | 3-4-5 N=9 | 3000 (HP) | | 39 | | |
| | | | 15 | 3-4-4 N=8 | 1500 (HP) | | 56 | | |
| 34.0 | 65.5 | **FAT CLAY (CH)**, gray, medium stiff to soft | 18 | 2-2-3 N=5 | 1000 (HP) | | 57 | | 106-39-67 |

Stratification lines are approximate. In-situ, the transition may be gradual. Hammer Type: Mobile Downhole

Advancement Method: Hollow Stem Auger to 15' then Tricone & Drilling Fluid to 75'

Abandonment Method: Borings backfilled with soil cuttings. Auger reversed upon completion.

See Exhibit A-4 for description of field procedures
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

**WATER LEVEL OBSERVATIONS**
▽ 12.7' Initially observed before HSA removal
Water level influenced by drilling fluid.

Midwest Testing Laboratory, Inc. A Terracon Company
4102 7th Ave. North
Fargo, North Dakota

Boring Started: 4/3/2013 | Boring Completed: 4/3/2013
Drill Rig: Mobile B-53 | Driller: DW
Project No.: M1135013 | Exhibit: A-4

# BORING LOG NO. B-1

Page 2 of 2

**PROJECT:** Proposed Bridge Replacement No. 09-129-26.1
**CLIENT:** Cass County Commission Fargo, North Dakota
**SITE:** Durbin Township Cass County, North Dakota

LOCATION See Exhibit A-2
Latitude: 46.86641° Longitude: -97.10587°
Surface Elev.: 99.5 (Ft.)

| DEPTH | ELEVATION (Ft.) | Description | RECOVERY (In.) | FIELD TEST RESULTS | LABORATORY TORVANE/HP (psf) | UNCONFINED COMPRESSIVE STRENGTH (psf) | WATER CONTENT (%) | DRY UNIT WEIGHT (pcf) | ATTERBERG LIMITS LL-PL-PI |
|---|---|---|---|---|---|---|---|---|---|
| | | **FAT CLAY (CH)**, gray, medium stiff to soft *(continued)* | | | | | | | |
| | | | 18 | 1-2-2 N=4 | 1500 (HP) | | 48 | | |
| 51.0 | 48.5 | **SILTY SAND (SM)**, medium to fine grained, dark gray, very dense | | | | | | | |
| | | | 12 | 100 for 11.5" | | | 23 | | |
| 60.0 | 39.5 | **SANDY LEAN CLAY WITH GRAVEL (CL)**, dark gray, hard to very hard, with lenses of silt | 15 | 15-25-35 N=60 | 8000 (HP) | | 15 | | |
| | | | 12 | 100 for 12" | | | 21 | | |
| | | | 10 | 100 for 11.5" | | | 10 | | |
| 76.0 | 23.5 | | 12 | 100 for 11.5" | | | | | |
| | | ***Boring Terminated at 76 Feet*** | | | | | | | |

Stratification lines are approximate. In-situ, the transition may be gradual. Hammer Type: Mobile Downhole

Advancement Method: Hollow Stem Auger to 15' then Tricone & Drilling Fluid to 75'

Abandonment Method: Borings backfilled with soil cuttings. Auger reversed upon completion.

See Exhibit A-4 for description of field procedures
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:
60': Cobbles @ 63' and 67'

**WATER LEVEL OBSERVATIONS**
▽ 12.7' Initially observed before HSA removal
Water level influenced by drilling fluid.

Midwest Testing Laboratory, Inc. A Terracon Company
4102 7th Ave. North
Fargo, North Dakota

Boring Started: 4/3/2013 | Boring Completed: 4/3/2013
Drill Rig: Mobile B-53 | Driller: DW
Project No.: M1135013 | Exhibit: A-5

NOTE:

SEE SHEET 6 FOR BORING LOCATIONS

CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09–129–26.1
**SOIL BORING 1**
PROJECT NO. **BRO-0009(044)**
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 11 | 37 |

## BORING LOG NO. B-2

Page 1 of 2

**PROJECT:** Proposed Bridge Replacement No. 09-129-26.1
**CLIENT:** Cass County Commission Fargo, North Dakota
**SITE:** Durbin Township Cass County, North Dakota

LOCATION See Exhibit A-2
Latitude: 46.86691° Longitude: -97.10564°
Surface Elev.: 99.5 (Ft.)

| DEPTH | ELEVATION (Ft.) | Description |
|---|---|---|
| 0.0 | 99.5 | |
| 0.8 | 98.7 | **FILL - SAND AND GRAVEL**, brown, frozen |
| | | **FILL - FAT CLAY AND TOPSOIL MIXTURE**, gray and black, stiff, frozen to 3.5' |
| 9.0 | 90.5 | **FAT CLAY (CH)**, dark grayish brown, stiff |
| 19.0 | 80.5 | **FAT CLAY (CH)**, light brown, stiff |
| 29.0 | 70.5 | **FAT CLAY (CH)**, grayish brown, medium stiff |

| DEPTH (FL.) | SAMPLE TYPE | RECOVERY (in.) | FIELD TEST RESULTS | LABORATORY TORVANE/HP (psf) | UNCONFINED COMPRESSIVE STRENGTH (psf) | WATER CONTENT (%) | DRY UNIT WEIGHT (pcf) | ATTERBERG LIMITS LL-PL-PI |
|---|---|---|---|---|---|---|---|---|
| 5 | | 6 | 5-6-8 N=14 | | | 31 | 87 | |
| | | 5 | 4-4-8 N=12 | | | 34 | 82 | |
| 10 | | 12 | 4-5-6 N=11 | 5000 (HP) | | 38 | | |
| | | 12 | 4-4-6 N=10 | 3000 (HP) | | 40 | | |
| 15 | | 12 | 4-4-6 N=10 | | | 43 | | |
| 20 | | 15 | 4-4-6 N=10 | | | | | |
| 25 | | 24 | | | 1950 | 57 | 66 | 102-36-66 |
| 30 | | | | | | | | |
| 35 | | 18 | 3-3-4 N=7 | 1500 (HP) | | 56 | | |
| 40 | | | | | | | | |

Stratification lines are approximate. In-situ, the transition may be gradual. Hammer Type: Mobile Downhole

Advancement Method:
Hollow Stem Auger to 25' then Tricone & Drilling Fluid to 67.5'

Abandonment Method:
Borings backfilled with soil cuttings. Auger reversed upon completion.

See Exhibit A-4 for description of field procedures
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

**WATER LEVEL OBSERVATIONS**
13.6' Initially observed before HSA removal
Water level influenced by drilling fluid.

Midwest Testing Laboratory, Inc. — A Terracon Company
4102 7th Ave. North
Fargo, North Dakota

Boring Started: 4/3/2013 Boring Completed: 4/4/2013
Drill Rig: Mobile B-53 Driller: DW
Project No.: M1135013 Exhibit: A-6

## BORING LOG NO. B-2

Page 2 of 2

**PROJECT:** Proposed Bridge Replacement No. 09-129-26.1
**CLIENT:** Cass County Commission Fargo, North Dakota
**SITE:** Durbin Township Cass County, North Dakota

LOCATION See Exhibit A-2
Latitude: 46.86691° Longitude: -97.10564°
Surface Elev.: 99.5 (Ft.)

| DEPTH | ELEVATION (Ft.) | Description |
|---|---|---|
| | | **FAT CLAY (CH)**, grayish brown, medium stiff *(continued)* |
| 48.0 | 51.5 | |
| | | **SANDY LEAN CLAY WITH GRAVEL (CL)**, dark gray, hard to very hard, with lenses of silt |
| 67.5 | 32 | |
| | | ***Tricone refusal on boulder at 67.5 Feet*** |

| DEPTH (FL.) | SAMPLE TYPE | RECOVERY (in.) | FIELD TEST RESULTS | LABORATORY TORVANE/HP (psf) | UNCONFINED COMPRESSIVE STRENGTH (psf) | WATER CONTENT (%) | DRY UNIT WEIGHT (pcf) | ATTERBERG LIMITS LL-PL-PI |
|---|---|---|---|---|---|---|---|---|
| 45 | | 15 | 2-3-3 N=6 | 1500 (HP) | | 46 | | |
| 50 | | 12 | 100 for 11" | | 14750 | 11 | 124 | |
| 55 | | 15 | 25-22-25 N=47 | 3500 (HP) | | 17 | | |
| 60 | | 15 | 12-18-28 N=46 | | 7120 | 17 | 116 | |
| 65 | | 12 | 100 for 10.5" | 12000 (HP) | | 29 | | |

Stratification lines are approximate. In-situ, the transition may be gradual. Hammer Type: Mobile Downhole

Advancement Method:
Hollow Stem Auger to 25' then Tricone & Drilling Fluid to 67.5'

Abandonment Method:
Borings backfilled with soil cuttings. Auger reversed upon completion.

See Exhibit A-4 for description of field procedures
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

**WATER LEVEL OBSERVATIONS**
13.6' Initially observed before HSA removal
Water level influenced by drilling fluid.

Midwest Testing Laboratory, Inc. — A Terracon Company
4102 7th Ave. North
Fargo, North Dakota

Boring Started: 4/3/2013 Boring Completed: 4/4/2013
Drill Rig: Mobile B-53 Driller: DW
Project No.: M1135013 Exhibit: A-7

NOTE:

SEE SHEET 6 FOR BORING LOCATIONS

CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER

BRIDGE NO. 09–129–26.1

**SOIL BORING 2**

PROJECT NO. **BRO-0009(044)**
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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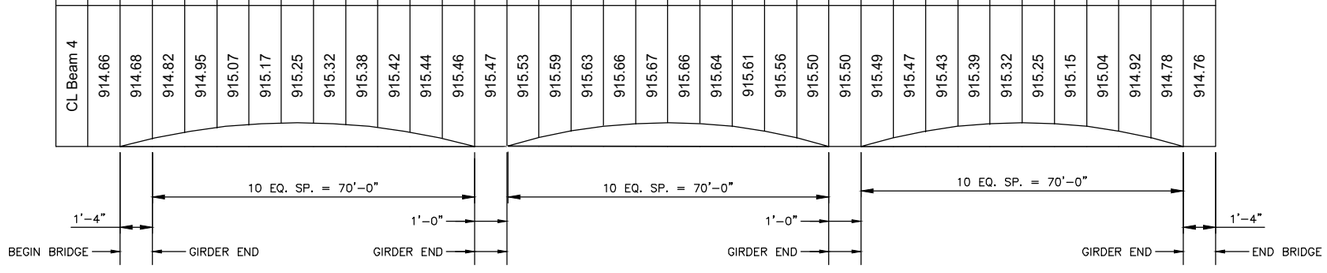
| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 12 | 37 |

N

| CL Beam 4 | CL Beam 3 | CL Beam 2 | CL Beam 1 |
|---|---|---|---|
| 914.66 | 914.87 | 914.90 | 914.77 |
| 914.68 | 914.89 | 914.92 | 914.79 |
| 914.82 | 915.03 | 915.06 | 914.92 |
| 914.95 | 915.16 | 915.19 | 915.04 |
| 915.07 | 915.28 | 915.31 | 915.15 |
| 915.17 | 915.38 | 915.41 | 915.25 |
| 915.25 | 915.47 | 915.49 | 915.33 |
| 915.32 | 915.53 | 915.55 | 915.39 |
| 915.38 | 915.58 | 915.60 | 915.43 |
| 915.42 | 915.62 | 915.63 | 915.47 |
| 915.44 | 915.64 | 915.65 | 915.49 |
| 915.46 | 915.64 | 915.66 | 915.50 |
| 915.47 | 915.65 | 915.66 | 915.50 |
| 915.53 | 915.72 | 915.73 | 915.56 |
| 915.59 | 915.78 | 915.78 | 915.61 |
| 915.63 | 915.82 | 915.82 | 915.64 |
| 915.66 | 915.85 | 915.85 | 915.66 |
| 915.67 | 915.86 | 915.86 | 915.67 |
| 915.66 | 915.85 | 915.85 | 915.66 |
| 915.64 | 915.82 | 915.82 | 915.63 |
| 915.61 | 915.78 | 915.78 | 915.59 |
| 915.56 | 915.73 | 915.72 | 915.53 |
| 915.50 | 915.66 | 915.65 | 915.47 |
| 915.50 | 915.66 | 915.64 | 915.46 |
| 915.49 | 915.65 | 915.64 | 915.44 |
| 915.47 | 915.63 | 915.62 | 915.42 |
| 915.43 | 915.60 | 915.58 | 915.38 |
| 915.39 | 915.55 | 915.53 | 915.32 |
| 915.32 | 915.49 | 915.47 | 915.25 |
| 915.25 | 915.41 | 915.38 | 915.17 |
| 915.15 | 915.31 | 915.28 | 915.07 |
| 915.04 | 915.19 | 915.16 | 914.95 |
| 914.92 | 915.06 | 915.03 | 914.82 |
| 914.78 | 914.92 | 914.89 | 914.68 |
| 914.76 | 914.90 | 914.87 | 914.66 |




ABUTMENT 1 PIER 2 PIER 3 ABUTMENT 4

## SCREED ELEVATIONS

NOT TO SCALE

NOTES:

1. ELEVATIONS ARE TO TOP OF FINISHED ROADWAY.
2. WEIGHT OF SCREED NOT INCLUDED IN CALCULATION OF DEFLECTIONS.
3. BEAM 1 IS WEST EXTERIOR BEAM.

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09–129–26.1
SCREED ELEVATIONS
PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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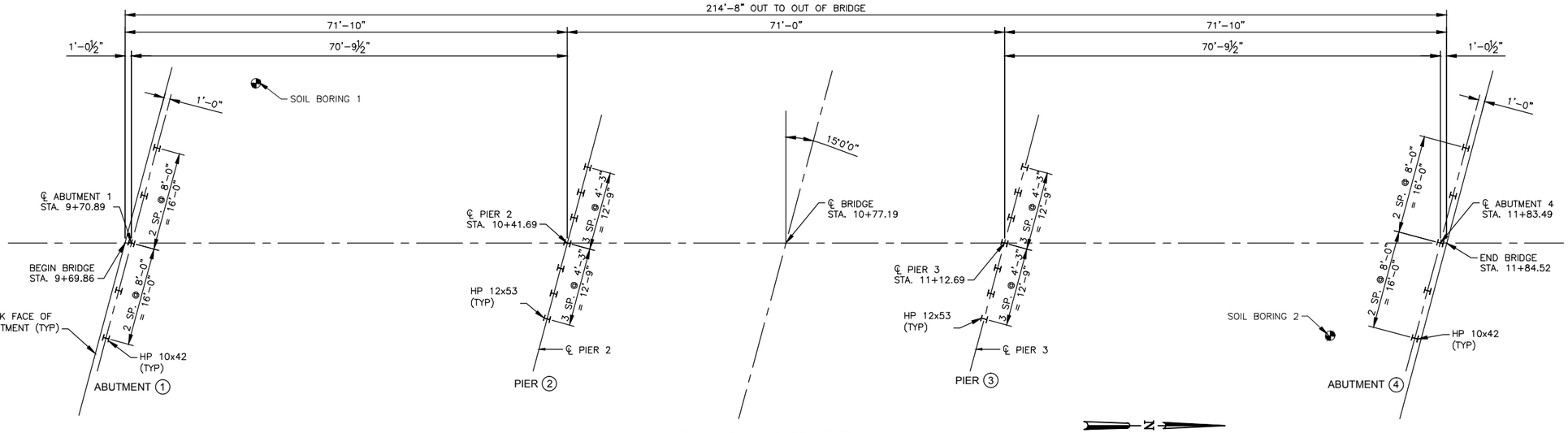
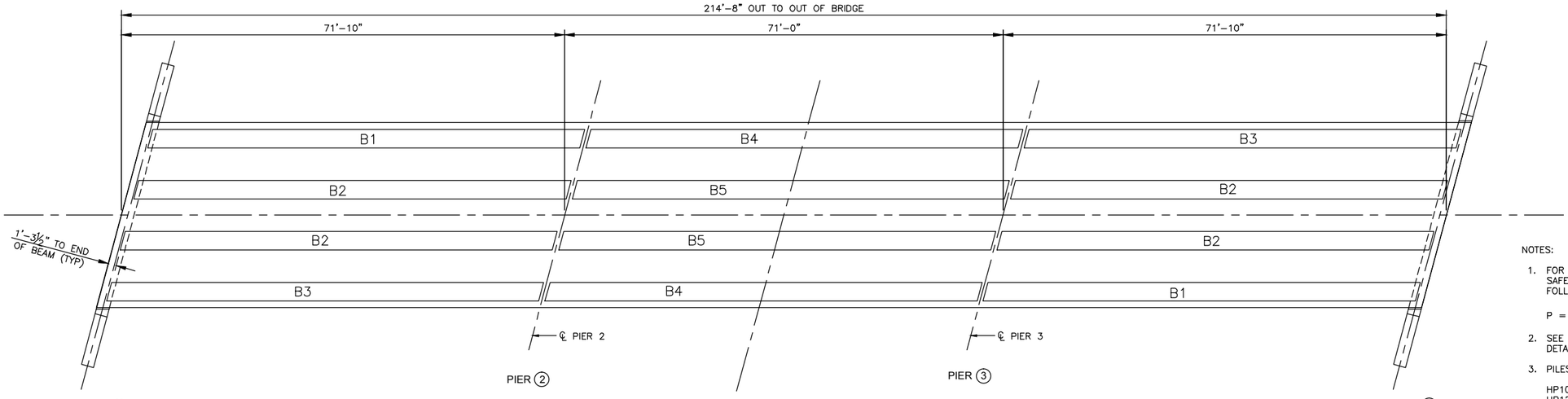
| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 13 | 37 |




## PILING LAYOUT PLAN




## BEAM FRAMING PLAN

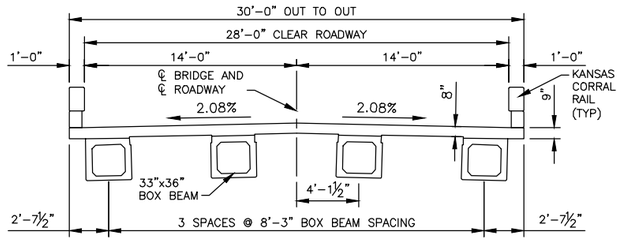
NOTES:

1. FOR DOUBLE OR SINGLE ACTING DIESEL HAMMERS, THE SAFE BEARING SHALL BE DETERMINED BY THE FOLLOWING FORMULA:

   $$P = \frac{4.5E}{S + 0.2} \times \frac{W + 0.2M}{W + M}$$

2. SEE STANDARD DRAWING D-622-1 FOR PILE SPLICE DETAILS.
3. PILES SHALL BE DRIVEN TO THE FOLLOWING LOADING:

   HP10x42 ~ 105 TONS
   HP12X53 ~ 130 TONS




## DECK SECTION

## BEARING SEAT ELEVATIONS

| GIRDER HT. = 33" | POSI-RISER = 1½" | DECK = 8" |
|---|---|---|
| | FILLER = ⅜" | TOTAL = 3.57' |

| BEAM LOCATION | WEST FACIA | WEST INTERIOR | EAST INTERIOR | EAST FACIA |
|---|---|---|---|---|
| ABUTMENT 1 | 911.21 | 911.35 | 911.31 | 911.10 |
| PIER 2 | 911.93 | 912.09 | 912.08 | 911.89 |
| PIER 3 | 911.89 | 912.08 | 912.09 | 911.39 |
| ABUTMENT 4 | 911.10 | 911.31 | 911.35 | 911.21 |

## PILE LOADING (TONS)

| LOCATION | DEAD LOAD | LIVE LOAD | DESIGN LOAD |
|---|---|---|---|
| ABUTMENT 1 | 45.7 | 28.2 | 73.9 |
| PIER 2 | 69.1 | 31.2 | 100.3 |
| PIER 3 | 69.1 | 31.2 | 100.3 |
| ABUTMENT 4 | 45.7 | 28.2 | 73.9 |
| | | | |

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09-129-26.1
BEAM FRAMING AND
PILING LAYOUT
PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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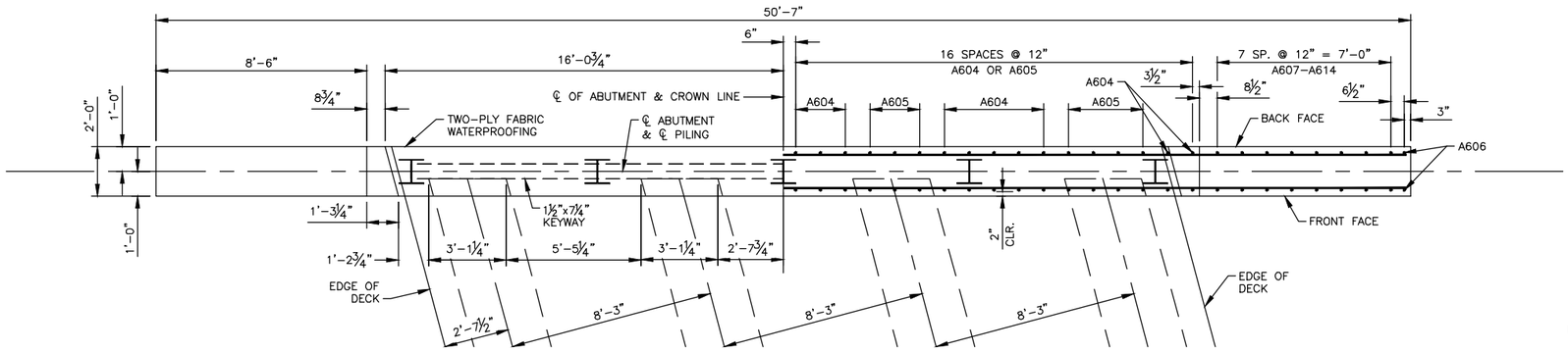
| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 14 | 37 |



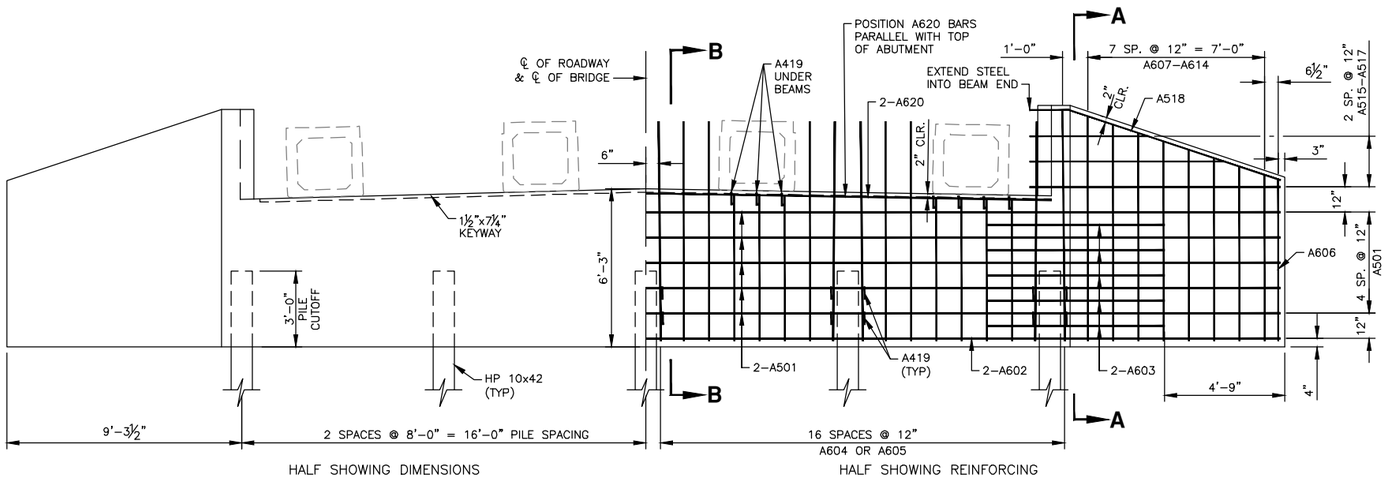

HALF SHOWING DIMENSIONS HALF SHOWING REINFORCING

## ABUTMENT PLAN VIEW

Scale 3 0 3 6 Feet

NOTE:

1. ALTERNATE OPEN END OF VERTICAL U-BARS IN WINGWALL.
2. ABUTMENT REINFORCING SYMMETRIC ABOUT ℄.

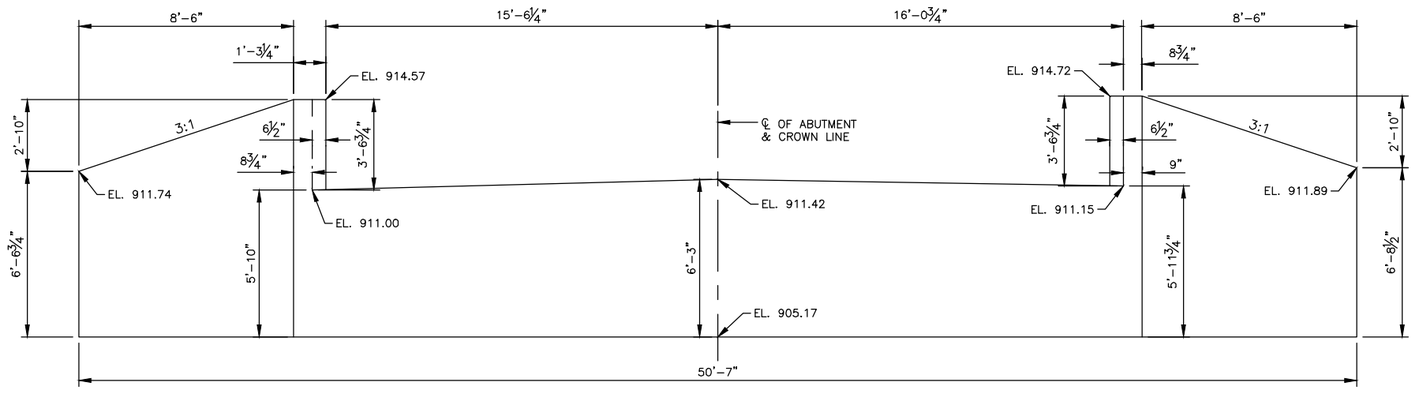



HALF SHOWING DIMENSIONS HALF SHOWING REINFORCING

## ABUTMENT ELEVATION VIEW

LOOKING SOUTHWEST @ ABUTMENT 1
LOOKING NORTHEAST @ ABUTMENT 4

Scale 3 0 3 6 Feet




## ABUTMENT ELEVATION VIEW

LOOKING SOUTHWEST @ ABUTMENT 1
LOOKING NORTHEAST @ ABUTMENT 4

Scale 3 0 3 6 Feet

| QUANTITIES & PROPERTIES ABUTMENT 1 & 4 (PER ABUTMENT) | |
|---|---|
| CLASS AE-3 CONCRETE | 25.8 C.Y. |
| CONCRETE STRENGTH | 3,000 PSI |
| REINFORCING STEEL | 2,619 LBS |
| REINFORCEMENT STRENGTH | 60,000 PSI |
| | |
| PILING (SEE LAYOUT – SHEET 13) | |

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09-129-26.1

# ABUTMENT DETAILS AND REINFORCEMENT

PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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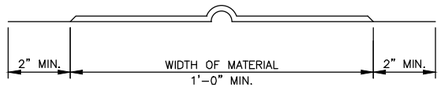
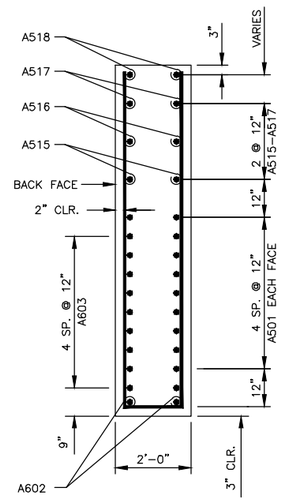
| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 15 | 37 |

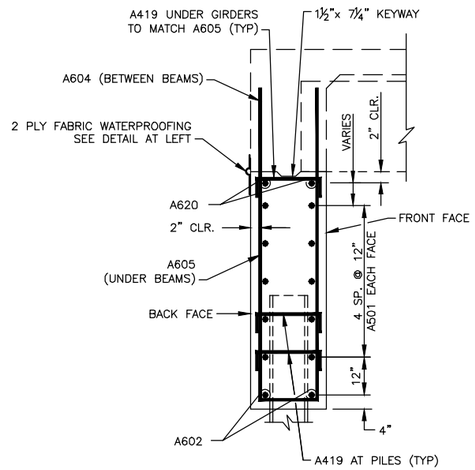



NOTE: ALL MATERIAL AND WORK SHALL BE INCLUDED IN THE BID ITEM OF CLASS AE–3 CONCRETE.

## TWO-PLY FABRIC WATERPROOFING DETAIL
NOT TO SCALE

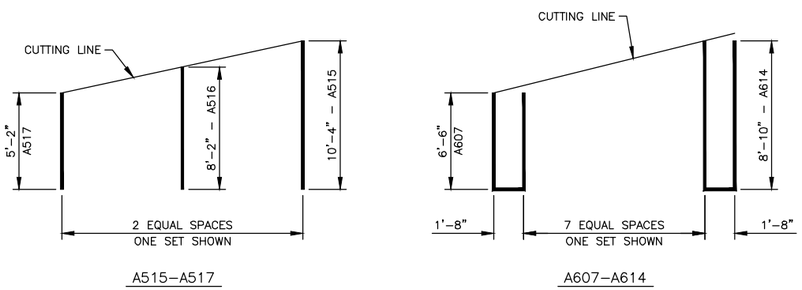



## SECTION A-A
NOT TO SCALE

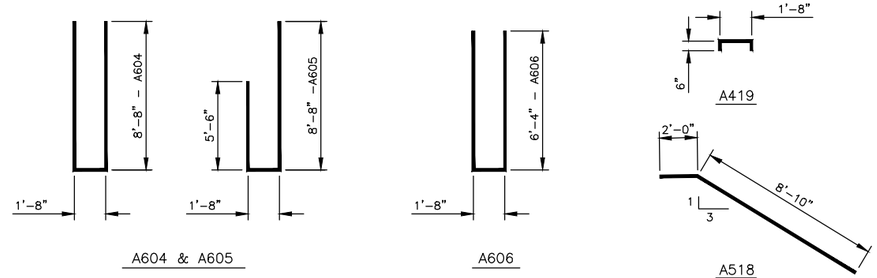



## SECTION B-B
NOT TO SCALE

| BILL OF REINFORCEMENT (PER ABUTMENT) | | | | |
|---|---|---|---|---|
| MARK | NO. | SIZE | LENGTH | SHAPE |
| A501 | 10 | 5 | 50' - 3" | STRT. |
| A602 | 2 | 6 | 50' - 3" | STRT. |
| A603 | 20 | 6 | 9' - 6" | STRT. |
| A604 | 20 | 6 | 19' - 0" | BENT |
| A605 | 14 | 6 | 15' - 10" | BENT |
| A606 | 2 | 6 | 14' - 4" | BENT |
| A607-A614 | 2 SETS | 6 | 136' - 0" | BENT |
| A515-A517 | 4 SETS | 5 | 23' - 8" | STRT. |
| A518 | 4 | 5 | 10' - 10" | BENT |
| A419 | 34 | 4 | 2' - 8" | BENT |
| A620 | 2 | 6 | 33' - 0" | STRT. |




## BAR CUTTING DETAIL
NOT TO SCALE




## BENT BAR DETAILS
NOT TO SCALE
DIMENSIONS ARE OUT TO OUT

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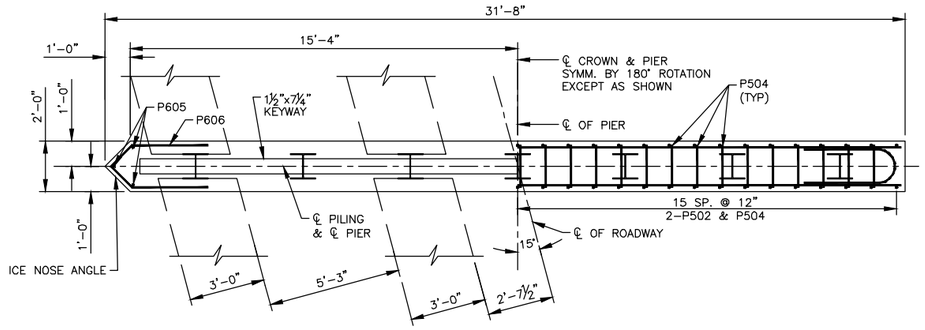
CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09–129–26.1
# ABUTMENT DETAILS
PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

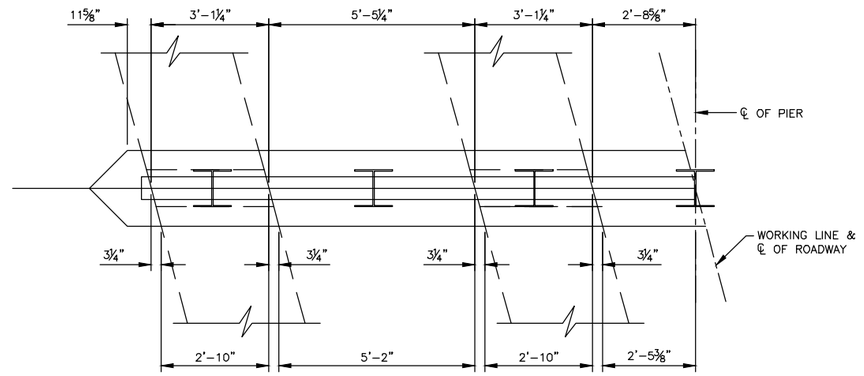
| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 16 | 37 |




HALF SHOWING DIMENSIONS HALF SHOWING REINFORCING

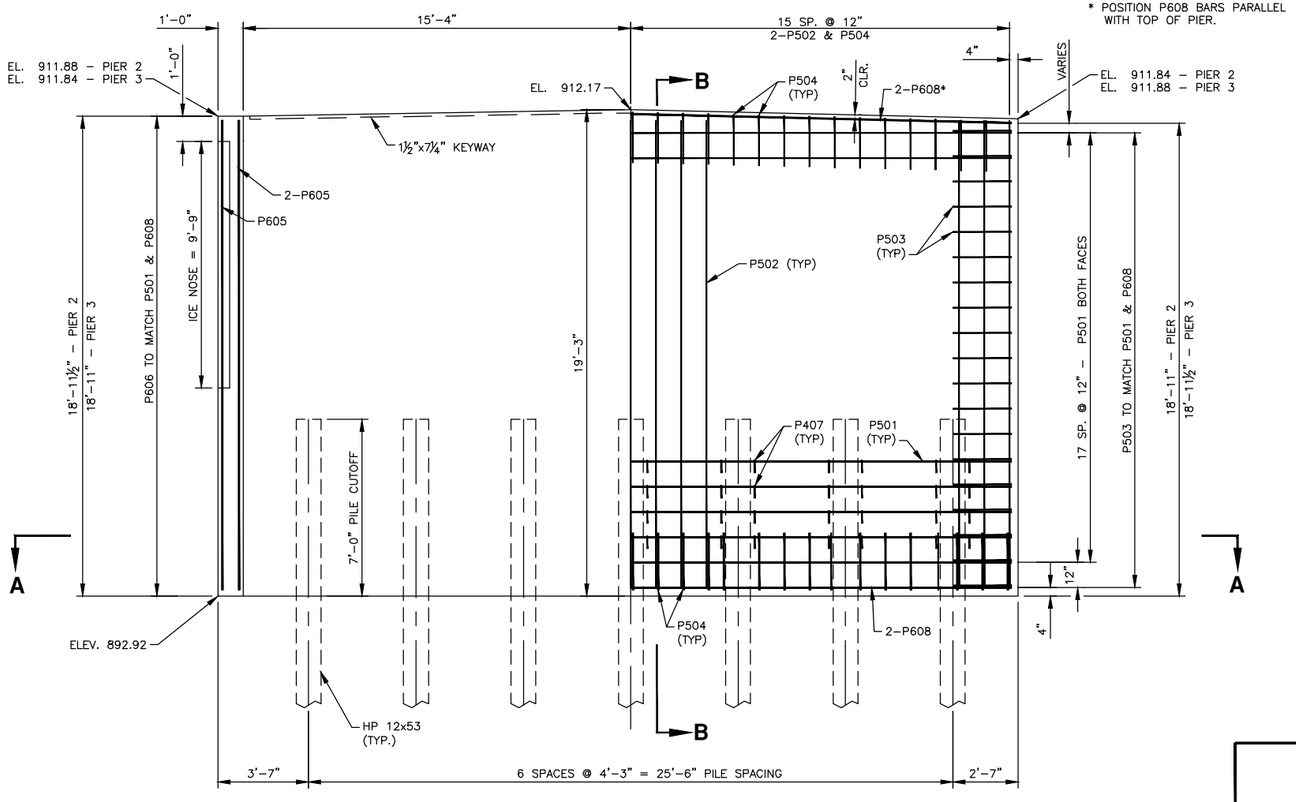
## PIER PLAN VIEW

Scale 3 0 3 6 Feet




## BOX BEAM DIMENSIONING DETAIL

NOT TO SCALE

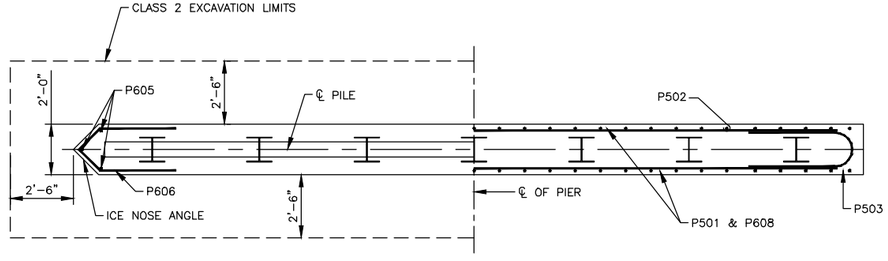



HALF SHOWING DIMENSIONS HALF SHOWING REINFORCING

## PIER ELEVATION VIEW

LOOKING NORTHEAST

Scale 3 0 3 6 Feet




HALF SHOWING DIMENSIONS HALF SHOWING REINFORCING

## SECTION A-A

Scale 3 0 3 6 Feet

| QUANTITIES & PROPERTIES (PER PIER) | |
|---|---|
| CLASS AE–3 CONCRETE | 44.1 C.Y. |
| CONCRETE STRENGTH | 3,000 PSI |
| REINFORCING STEEL | 3,579 LBS |
| REINFORCEMENT STRENGTH | 60,000 PSI |
| | |
| PILING (SEE LAYOUT – SHEET 13) | |

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09–129–26.1

# PIER DETAILS AND REINFORCEMENT

PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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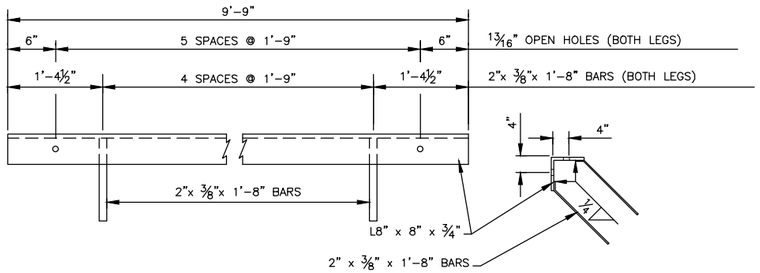
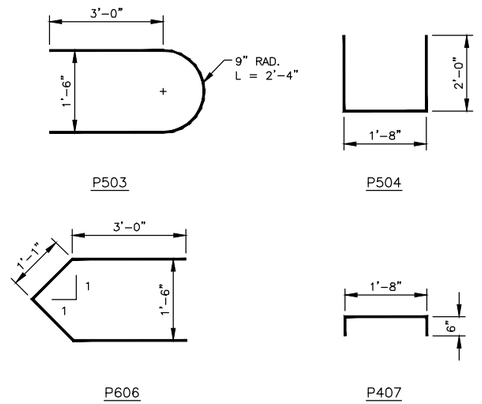
| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 17 | 37 |




## ICE NOSE DETAIL

NOT TO SCALE

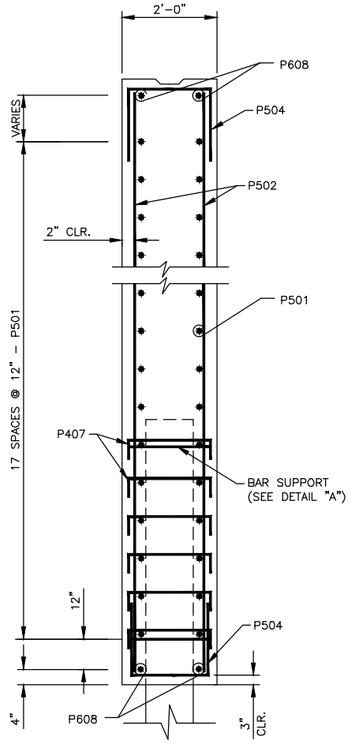



## BENT BAR DETAILS

DIMENSIONS SHOWN ARE OUT TO OUT
NOT TO SCALE

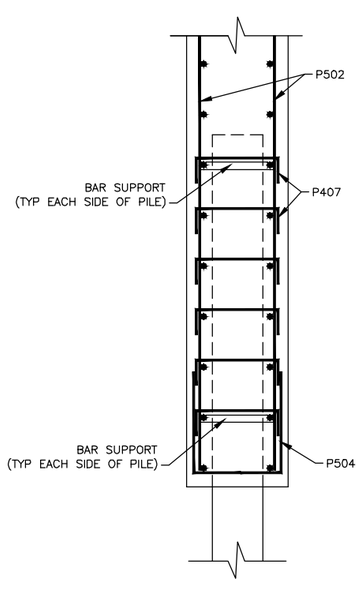
| BILL OF REINFORCEMENT (PER PIER) | | | | |
|---|---|---|---|---|
| MARK | NO. | SIZE | LENGTH | SHAPE |
| P501 | 36 | 5 | 30' - 6" | STRT. |
| P502 | 62 | 5 | 18' - 6" | STRT. |
| P503 | 20 | 5 | 8' - 4" | BENT |
| P504 | 62 | 5 | 5' - 8" | BENT |
| P605 | 3 | 6 | 18' - 6" | STRT. |
| P606 | 20 | 6 | 8' - 2" | BENT |
| P407* | 104 | 4 | 2' - 8" | BENT |
| P608 | 4 | 6 | 30' - 6" | STRT. |

*20 ADDITIONAL P407 BARS HAVE BEEN INCLUDED TO BE PLACED AT THE CONTRACTORS DISCRETION IN ORDER TO INCREASE CAGE RIGIDITY IN THE EVENT THE REINFORCING CAGE IS CONSTRUCTED OUTSIDE OF PIER CONCRETE FORMS. UNUSED P407 BARS WILL NOT BE INCLUDED IN FINAL PAY QUANTITY.

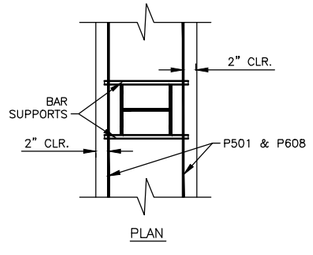



## SECTION B-B

NOT TO SCALE



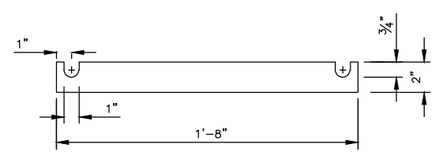

ELEVATION




PLAN

## DETAIL "A"

NOT TO SCALE




NOTE:
2" x 3/8" FLAT BAR TO BE INCIDENTAL TO REINFORCING STEEL.

## BAR SUPPORT DETAIL

NOT TO SCALE

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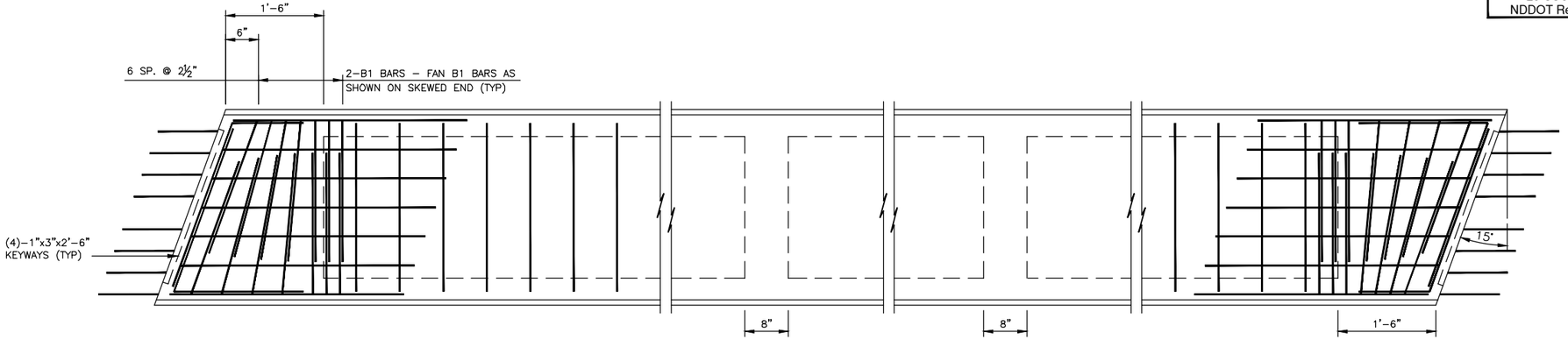
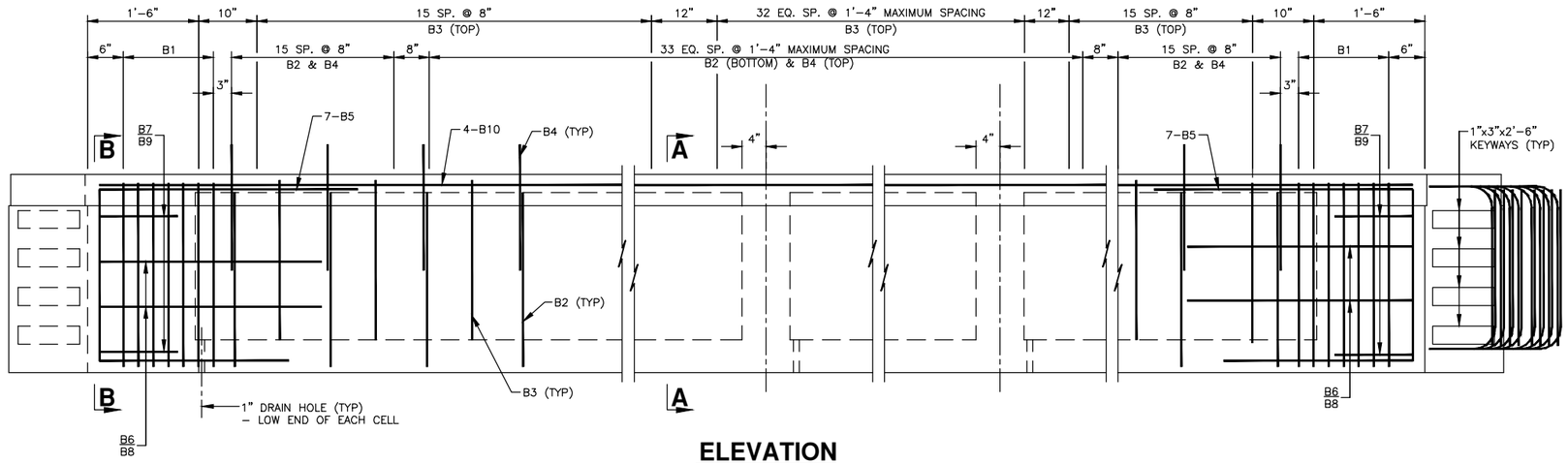
CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09-129-26.1
PIER DETAILS
PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 18 | 37 |




## PLAN



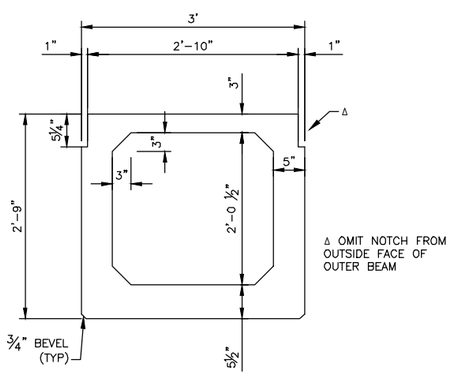

## ELEVATION

| BEAM SECTION DATA |
|---|
| WT = 601 LBS/FT + 3275 LBS |
| CROSS SECTIONAL AREA = 558.0 $IN^2$ |
| C.G. (FROM BOTTOM) = 14.9 IN |
| I = 73,588 $IN^4$ |
| SB = 4,949 $IN^3$ |

| BILL OF REINFORCEMENT (PER BEAM) | | | | |
|---|---|---|---|---|
| MARK | NO. | SIZE | LENGTH | SHAPE |
| B1 | 28 | 4 | 6' - 10.5" | BENT |
| B2* | 66 | 4 | 7' - 5" | BENT |
| B3* | 65 | 4 | 7' - 0" | BENT |
| B4 | 66 | 4 | 6' - 9" | BENT |
| B5 | 14 | 5 | 8' - 7" | BENT |
| B6 | 4 | 4 | 5' - 8" | BENT |
| B7 | 4 | 4 | 3' - 8" | BENT |
| B8 | 4 | 4 | 6' - 7" | BENT |
| B9 | 4 | 4 | 4' - 7" | BENT |
| B10 | 4 | 4 | 69' - 8" | STRT. |
| T1** | 32 | 4 | 4' - 9" | STRT. |

* WELDED WIRE REINFORCING WITH MINIMUM CIRCUMFERENTIAL STEEL AREA OF 0.15 SQ IN PER FT MAY BE SUBSTITUTED FOR B2 AND B3 BARS.

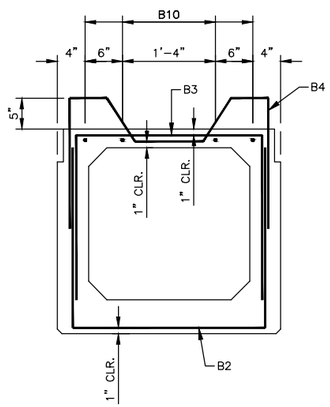
** FIELD BEND AS SHOWN (GRADE 40).




Δ OMIT NOTCH FROM OUTSIDE FACE OF OUTER BEAM

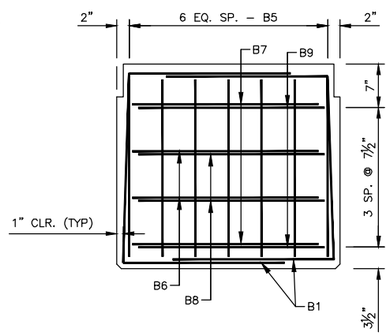
(SHOWING DIMENSIONS)

## A - A

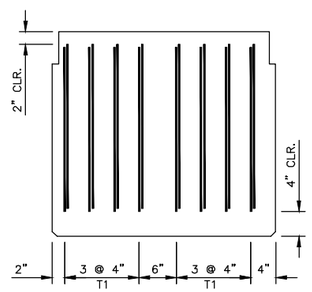



(SHOWING REINFORCING)

## A - A




## B - B




## END VIEW

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER

BRIDGE NO. 09–129–26.1

**33 INCH BOX BEAM**

PROJECT NO. **BRO-0009(044)**
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 19 | 37 |

NOTES:

AT LEAST 14 DAYS PRIOR TO THE FORMING AND POURING OF ANY BEAMS, THE CONTRACTOR SHALL SUBMIT WORKING DRAWINGS TO THE ENGINEER FOR REVIEW. THE WORKING DRAWINGS SHALL INCLUDE THE TOTAL INITIAL PRESTRESS FORCE AND THE LOSSES IN THE PRESTRESS DUE TO ELASTIC SHORTENING, SHRINKING OR CREEPING OF CONCRETE AND THE RELAXATION OF STEEL STRESS AS DETERMINED BY THE CONTRACTOR FOR HIS METHOD OF STRESSING.

WORKING DRAWINGS SHALL SHOW STRAND LAYOUT, PULL DOWN LOCATIONS, TENSIONING FORCES, ELONGATION AND ANY PROPOSED CHANGES IN REINFORCING STEEL.

THE FINAL PRESTRESS FORCE (REMAINING AFTER ALL LOSSES HAVE BEEN ACCOUNTED FOR) AND ITS CORRESPONDING CENTER OF GRAVITY, SHALL BE SELECTED FROM THOSE ON A CURVE DETERMINED BY THE THREE VALUES SHOWN.

THE BEAMS SHALL BE POURED IN ALL STEEL FORMS.

ALL REINFORCING STEEL SHALL HAVE A CLEARANCE OF 1" UNLESS OTHERWISE NOTED.

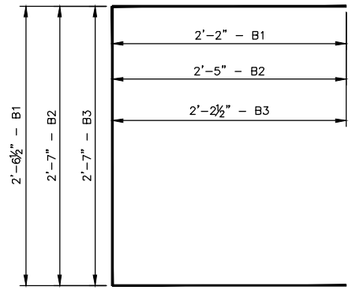
MINOR CHANGES TO THE SHAPE OF THE BEAM AND TO REINFORCING STEEL MAY BE MADE TO ACCOMMODATE THE FORMS OF VARIOUS CONTRACTORS AND THEIR CONSTRUCTION METHODS WITH THE APPROVAL OF THE ENGINEER.

THE TOPS OF THE BEAMS SHALL BE ROUGH FLOATED AND BROOMED TRANSVERSELY FOR BOND.

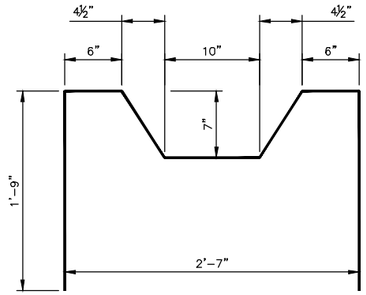
PROVIDE HANDLING HOOKS OR DEVICES AS REQUIRED BY THE CONTRACTOR. HOOKS OR DEVICES PROVIDED WILL BE SUBJECT TO APPROVAL BY THE ENGINEER AND SHALL BE INSTALLED WITHIN 4'–0" OF THE END OF BEAM.

HOLES AND INSERTS TO ACCOMODATE THE DIAPHRAGM BARS SHALL BE PROVIDED IN THE BEAMS AT LOCATIONS AS SHOWN AT NO ADDITIONAL COST TO OWNER.

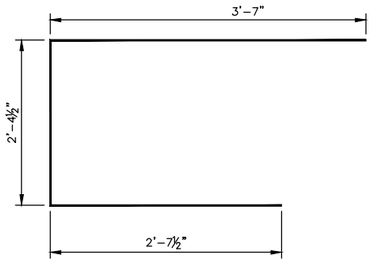
BEAMS SHALL BE CAST NO MORE THAN 6 MONTHS BEFORE BEAM PLACEMENT ON THE PROJECT.



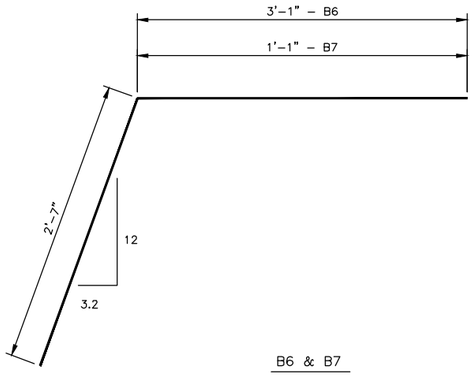

B1, B2, & B3



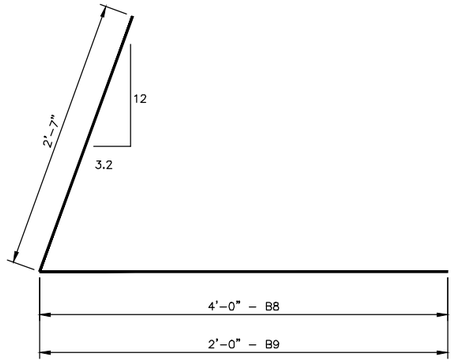

B4




B5



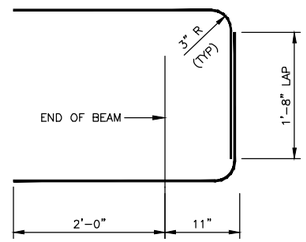

B6 & B7




B8 & B9

(DIMENSIONS SHOWN ARE OUT TO OUT)

## BENT BAR DETAILS



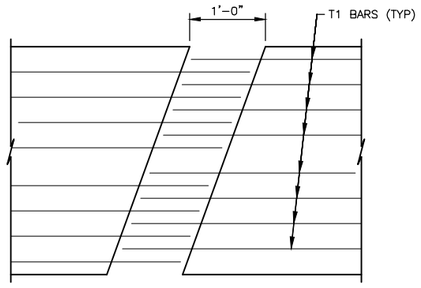

(AT PIERS)

T1




(AT ABUTMENTS)

T1




## BEAM END PLAN AT PIER

| PRESTRESSING DATA | | | | | |
|---|---|---|---|---|---|
| C.G. | FINAL FORCE | DETENSION STRENGTH | ACCEPTANCE STRENGTH | WEIGHT (TONS) | BEAM LENGTH |
| 2.25 | 789.3 k | 6000 psi (Min) | 6500 psi (Min) | 22.7 | 70'-0" |
| 2.50 | 798.6 k | | | | |
| 2.75 | 808.1 k | | | | |

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09–129–26.1
BOX BEAM REBAR

PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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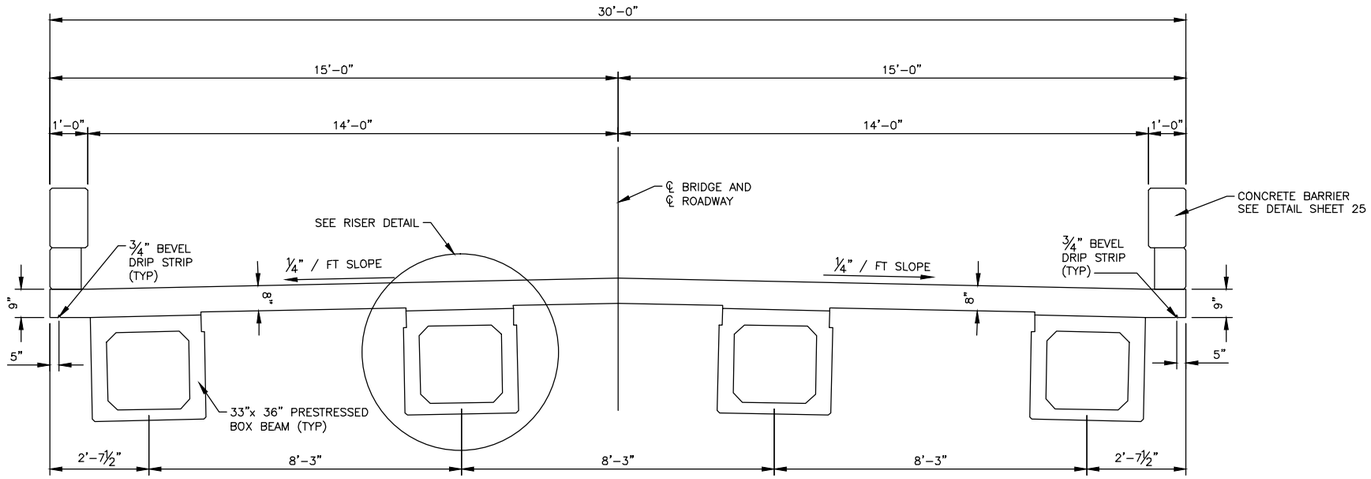
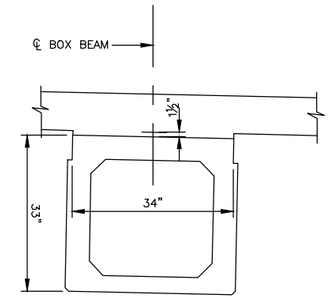
| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 20 | 37 |



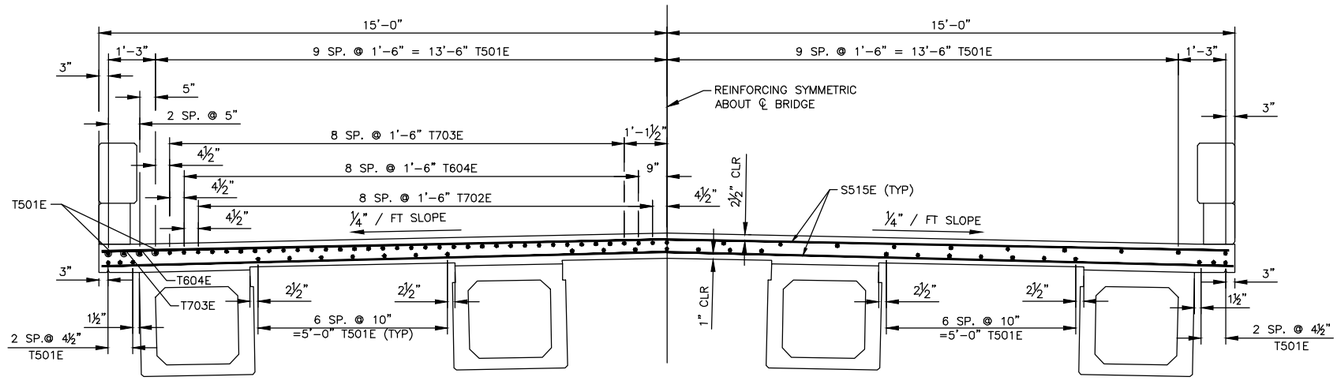

## SLAB ELEVATION VIEW
(SHOWING DIMENSIONS)

2 0 2 4
Scale Feet




THE 1½" DIMENSION SHOWN IS LOCATED AT THE SUPPORTS. THE ANTICIPATED MIDSPAN RISER IS 1". THE RISER SHALL BE ADJUSTED TO MAINTAIN THE 8" SLAB THICKNESS.

## RISER DETAIL
NOT TO SCALE




SHOWING REINFORCEMENT OVER SUPPORT

SHOWING REINFORCEMENT OVER MIDSPAN

## SLAB ELEVATION VIEW
(SHOWING REINFORCEMENT)

2 0 2 4
Scale Feet

NOTES:

1. RAIL REINFORCING IN DECK OMITTED FOR CLARITY.
2. SEE SHEETS 25 & 26 FOR RAIL REINFORCING DETAILS.

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER

BRIDGE NO. 09-129-26.1

# SUPERSTRUCTURE LAYOUT

PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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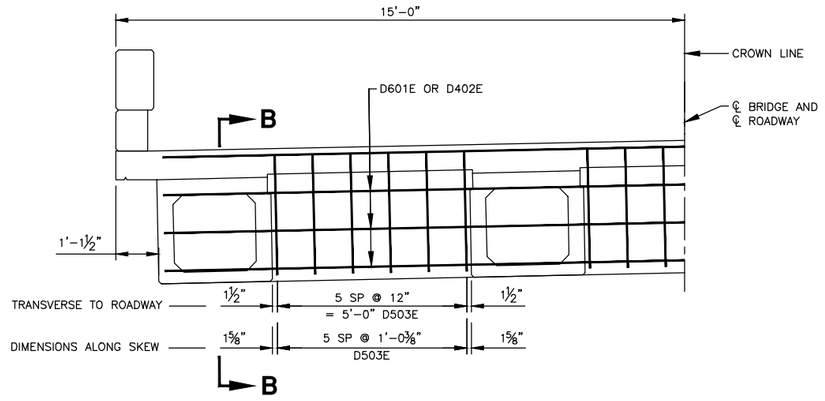
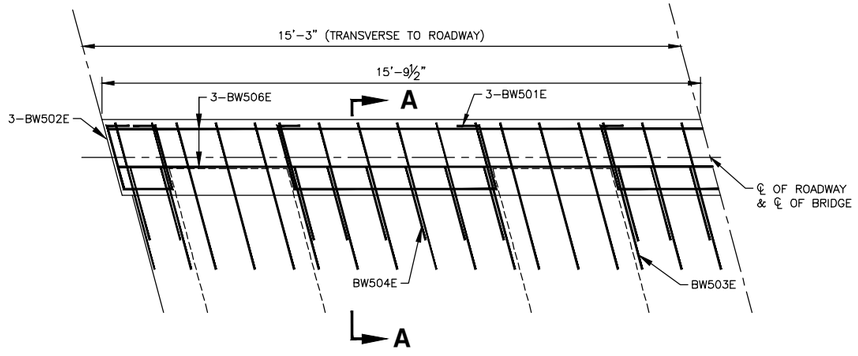
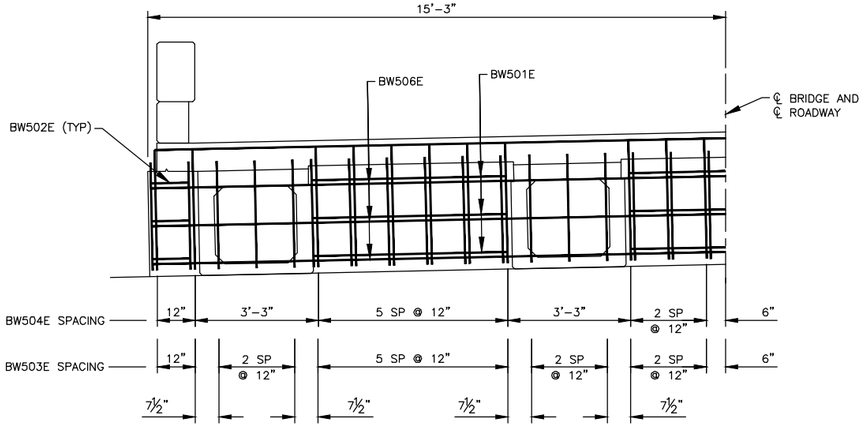
| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 21 | 37 |



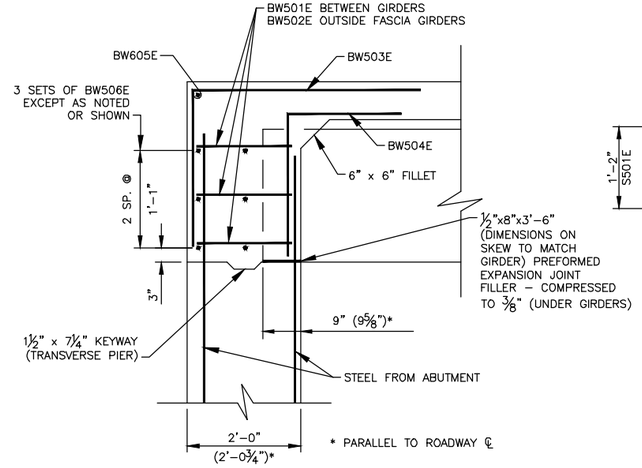

## HALF SLAB SECTION AT PIER




## HALF END BEAM - PLAN VIEW

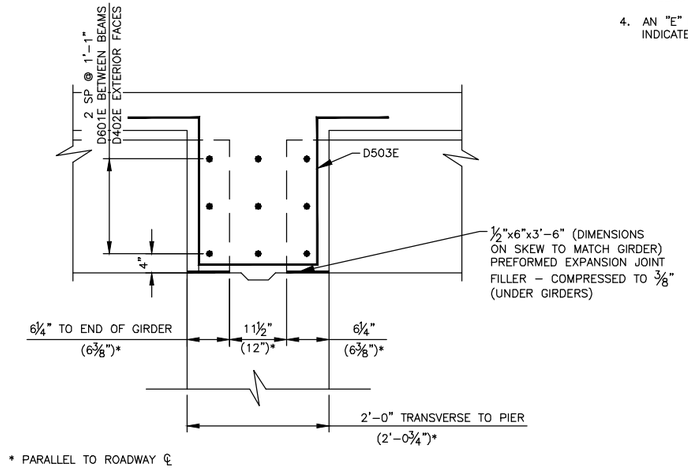



## HALF END BEAM - ELEVATION VIEW



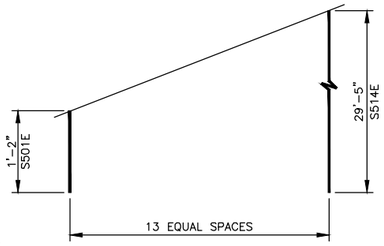

## SECTION A-A

NOT TO SCALE

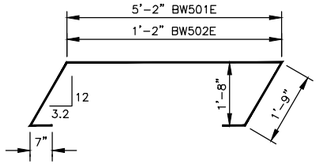



## SECTION B-B

NOT TO SCALE




S501E–S514E



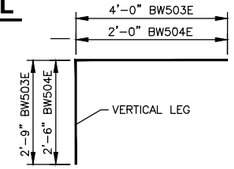

BW501E & BW502E

## BAR CUTTING DETAIL

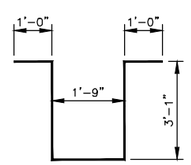
NOT TO SCALE

NOTES:

1. FABRICATION AND TOLERANCES SHALL BE IN ACCORDANCE WITH THE C.R.S.I. MANUAL OF STANDARD PRACTICE.
2. ALL DIMENSIONS ARE OUT TO OUT OF BARS.
3. NOMINAL LENGTH OF EACH BENT BAR OR CUT BAR IS THE SUM TOTAL OF DETAILING DIMENSIONS FOR THAT BAR, UNLESS OTHERWISE NOTED.
4. AN "E" FOLLOWING A BAR DESIGNATION INDICATES AN EPOXY COATED BAR.




BW503E & BW504E




D503E

## BENT BAR DETAILS

DIMENSIONS SHOWN ARE OUT TO OUT
NOT TO SCALE

**SUPERSTRUCTURE**

BILL OF REINFORCEMENT

| | MARK | NO. | SIZE | LENGTH | SHAPE |
|---|---|---|---|---|---|
| | BW501E | 18 | 5 | 9' - 10" | BENT |
| | BW502E | 12 | 5 | 5' - 10" | BENT |
| | BW503E | 68 | 5 | 6' - 9" | BENT |
| | BW504E | 44 | 5 | 4' - 6" | BENT |
| | BW605E | 2 | 6 | 30' - 9" | STRT. |
| | BW506E | 12 | 5 | 31' - 3" | STRT. |
| | | | | | |
| | D601E | 6 | 6 | 28' - 5" | STRT. |
| | D402E | 36 | 4 | 5' - 1" | STRT. |
| | D503E | 36 | 5 | 9' - 11" | BENT |
| | | | | | |
| | S501E-S514E | 4 SETS | 5 | 214' - 1" | STRT. |
| | S515E | 706 | 5 | 29' - 8" | STRT. |
| | | | | | |
| ① ③ | T501E | 48 | 5 | 220' - 4" | STRT. |
| | T702E | 36 | 7 | 11' - 7" | STRT. |
| | T703E | 40 | 7 | 24' - 0" | STRT. |
| ② ③ | T604E | 20 | 6 | 111' - 2" | STRT. |

① 2'–0" SPLICE LENGTH
② 3'–0" SPLICE LENGTH
③ SEE SHEET 23 FOR DETAIL

| QUANTITIES & PROPERTIES | |
|---|---|
| CLASS AAE–3 CONCRETE | 197.6 C.Y. |
| CONCRETE STRENGTH | 3,000 PSI |
| REINFORCING STEEL – EPOXY | 42,100 LBS |
| REINFORCEMENT STRENGTH | 60,000 PSI |

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09–129–26.1
SUPERSTRUCTURE DETAILS
PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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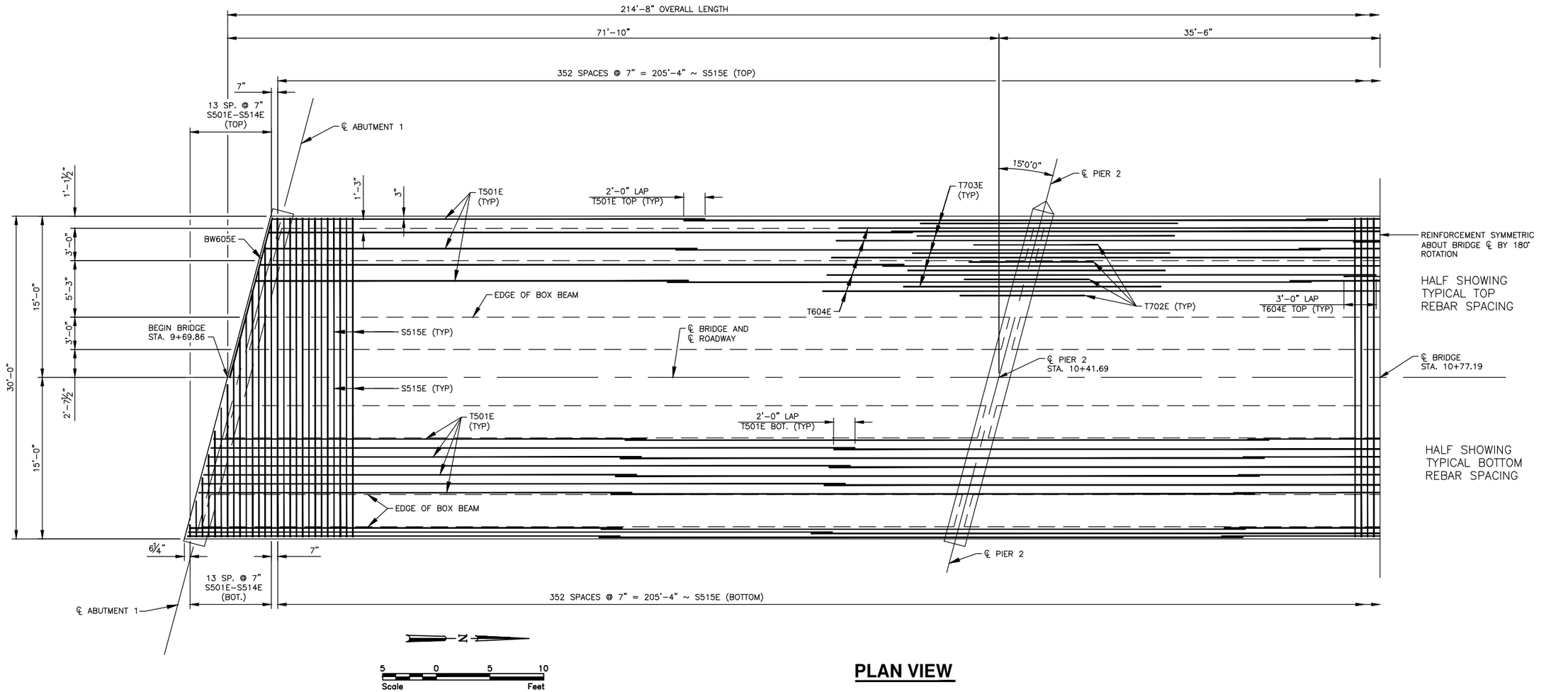
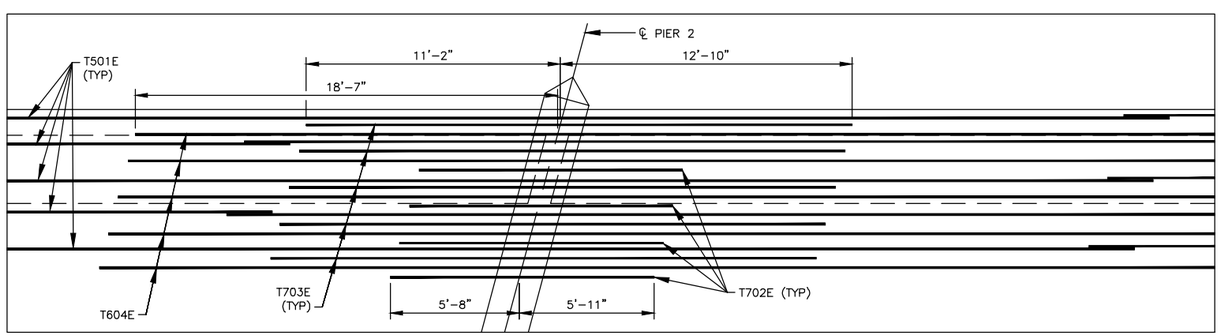
| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 22 | 37 |




## PLAN VIEW




## PIER 2 DETAIL

(SYMMETRIC BY 180° ROTATION @ PIER 3)

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER

BRIDGE NO. 09–129–26.1

# SLAB LAYOUT

PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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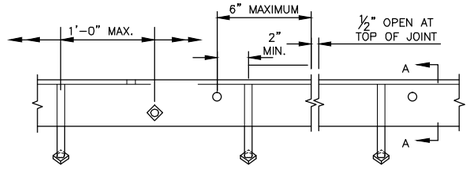
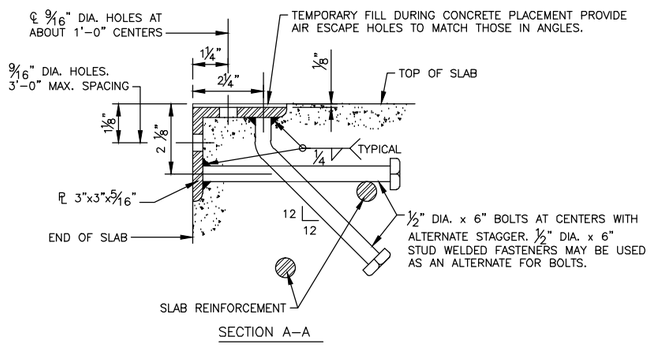
| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 23 | 37 |



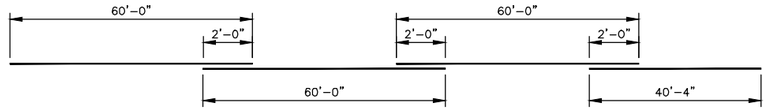

ELEVATION
(CONCRETE NOT SHOWN)




SECTION A–A

## PROTECTION PLAN DETAIL
NOT TO SCALE

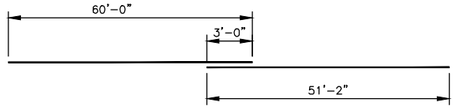
NOTES:
1. ANGLES SHALL EXTEND FULL WIDTH OF ROADWAY WITH A ½" OPEN JOINT AT EACH BREAK IN CROWN PROFILE.
2. ANGLES SHALL BE STRAIGHTENED TO A TOLERANCE OF 1/16" IN 10 FEET AFTER GALVANIZING.
3. MATERIAL: STRUCTURAL STEEL PER NDDOT 834, GALVANIZED AFTER FABRICATION PER AASHTO M111 (ASTM A123).
4. SET ANGLE TO PROPER GRADE AND CROWN.
5. ALL MATERIAL WILL BE PAID FOR AS STRUCTURAL STEEL.




## T501E DETAIL
NOT TO SCALE

NOTE:

TURN END FOR END SO THAT SPLICE LOCATIONS ARE STAGGERED




## T604E DETAIL
NOT TO SCALE

NOTE:

TURN END FOR END SO THAT SPLICE LOCATIONS ARE STAGGERED

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER

BRIDGE NO. 09–129–26.1

# SLAB LAYOUT

PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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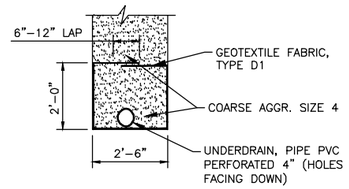
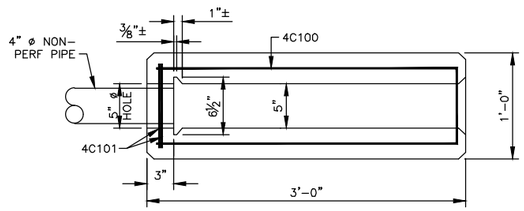
| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 24 | 37 |

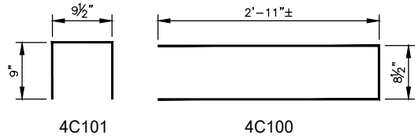



NOTE:
GEOTEXTILE FABRIC – TYPE D1, COARSE AGGR SIZE 4 AND SHALL BE INCIDENTAL TO THE PRICE BID FOUNDATION FILL.

## TRENCH DETAIL
NOT TO SCALE




PLAN

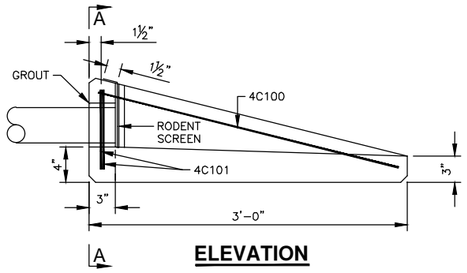



BENT BAR DETAILS

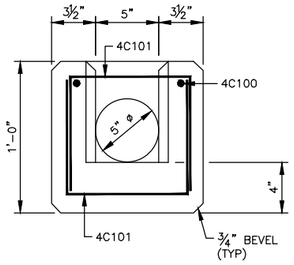
NOTES:

THE DIMENSIONS FOR THE RODENT SCREEN ARE APPROXIMATE TO ALLOW FOR BENDING AND A SNUG FIT INTO THE SLOT IN THE HEADWALL.

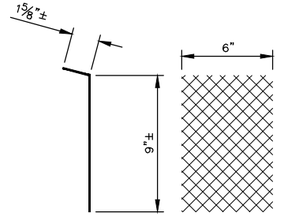
THE RODENT SCREEN SHALL BE FABRICATED FROM FLATTENED, EXPANDED METAL WITH SCREEN OPENINGS OF APPROXIMATELY 0.25 SQUARE INCHES. THE SCREEN SHALL BE 16 GAGE METAL AND BE HOT DIP GALVANIZED AFTER FABRICATION.




ELEVATION



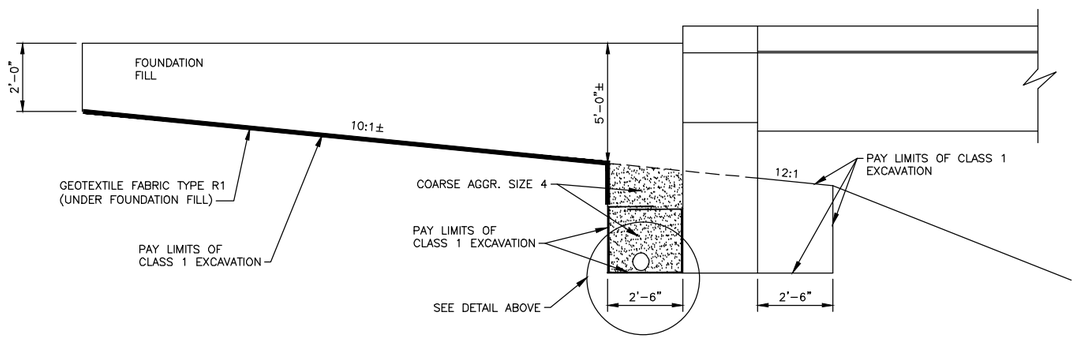

SECTION A-A




SIDE VIEW FRONT VIEW

## PRECAST CONCRETE HEADWALL DETAILS

## RODENT SCREEN DETAILS



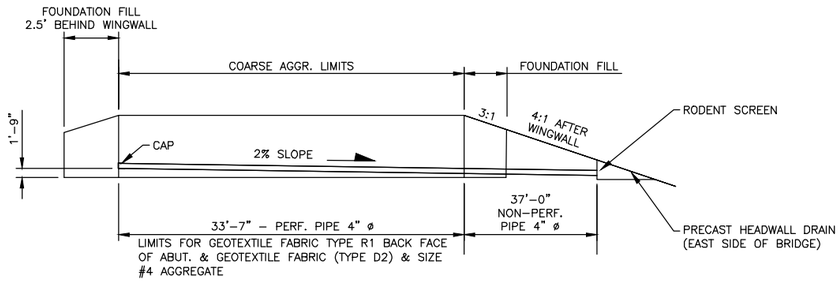

## DETAIL AT ABUTMENT

## SEEPAGE TRENCH DETAILS
NOT TO SCALE

NOTE:

ALL MATERIAL, EQUIPMENT, AND LABOR REQUIRED TO PLACE THE FOUNDATION FILL, COARSE AGGREGATE, AND GEOTEXTILE FABRIC SYSTEM SHALL BE INCLUDED IN THE BID FOR FOUNDATION FILL.

PAY QUANTITY = PLAN QUANTITY




## BACK FACE OF ABUTMENT
NOT TO SCALE

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09–129–26.1
ABUTMENT UNDERDRAIN DETAILS
PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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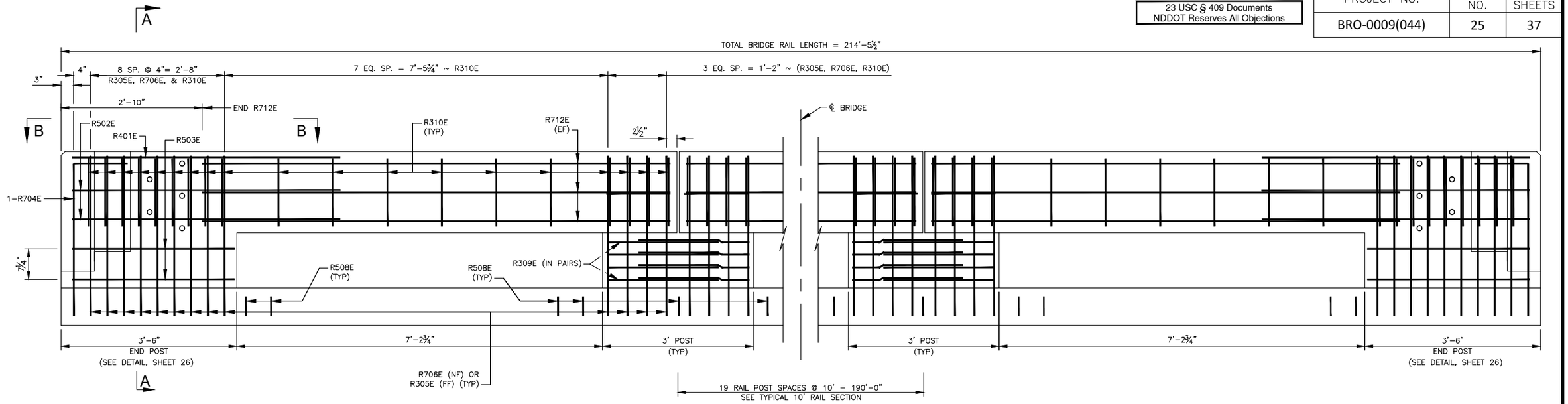
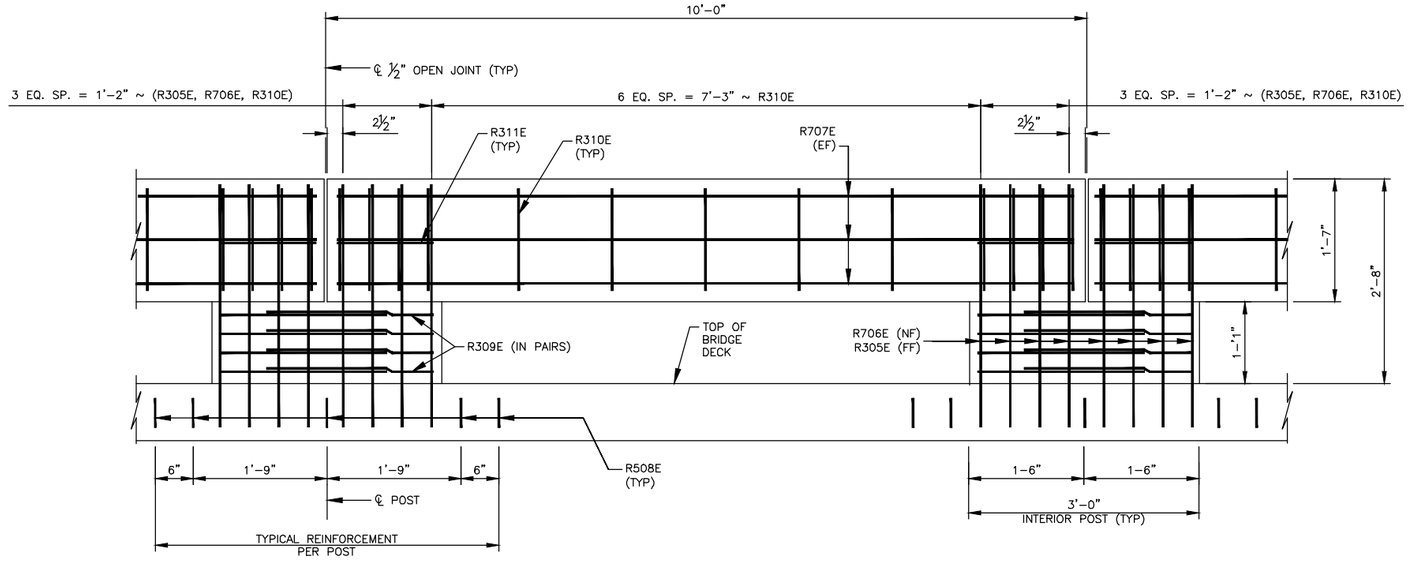
| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 25 | 37 |




## BRIDGE RAIL ELEVATION VIEW

NOT TO SCALE




## TYPICAL 10' RAIL SECTION

NOT TO SCALE

| LEGEND |
|---|
| NF = NEAR FACE |
| FF = FAR FACE |
| EF = EACH FACE |

NOTES:

1. REINFORCING STEEL AND CONCRETE FOR KANSAS CORRAL RAIL ARE QUANTIFIED ON SHEET 27.
2. VIEWS A–A, AND B–B ARE SHOWN ON SHEET 26.
3. REINFORCING SYMMETRIC ABOUT BRIDGE ℄ UNLESS OTHERWISE NOTED.

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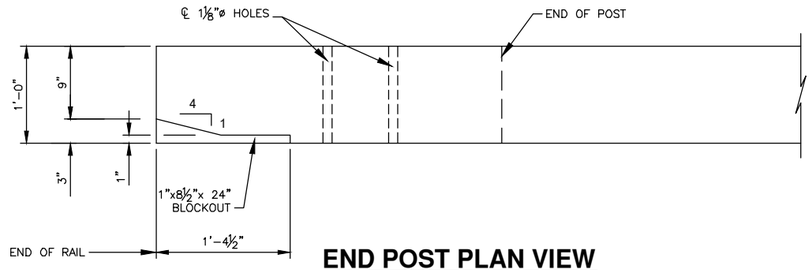
CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09–129–26.1
CONCRETE BARRIER

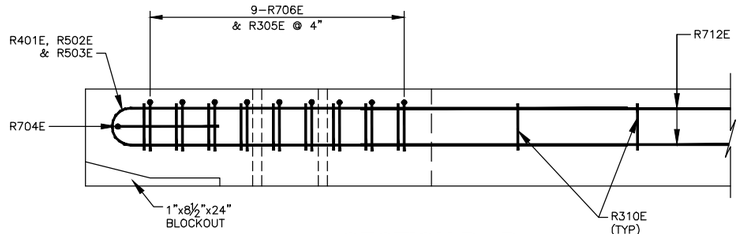
PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 26 | 37 |

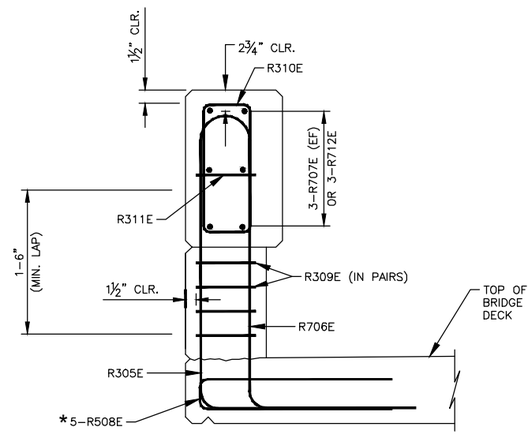



## END POST PLAN VIEW

(DIMENSIONS AT END OF RAIL)

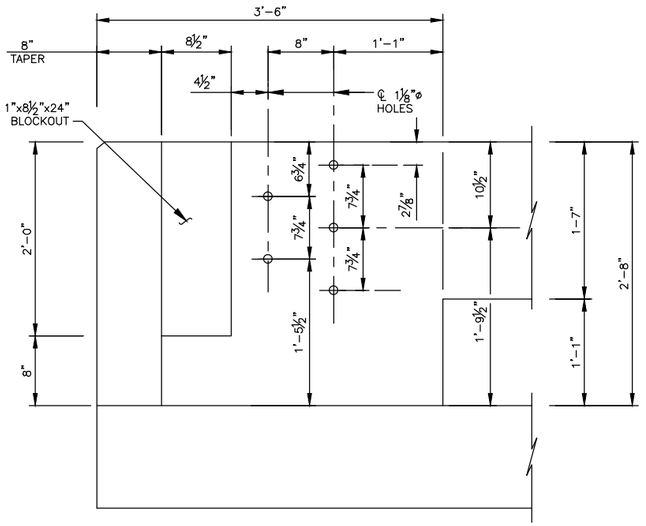



## SECTION B - B



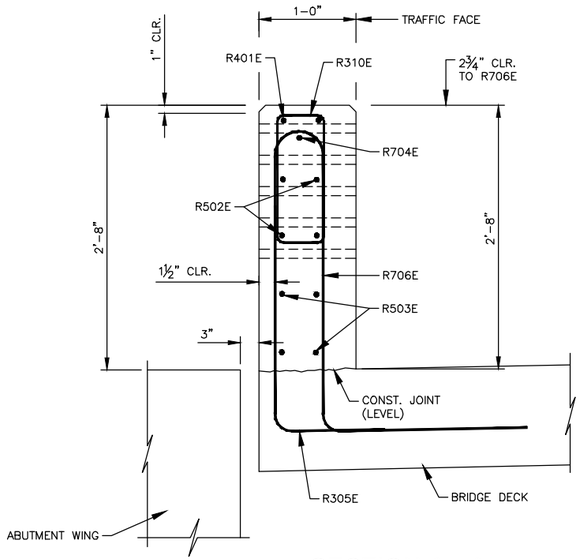

## TYPICAL INTERIOR POST

(SHOWING REINFORCING)

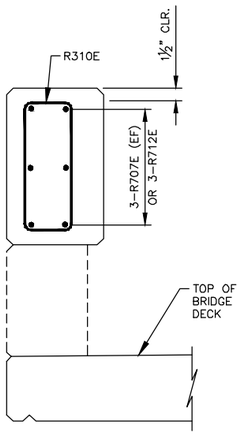



## END POST ELEVATION VIEW

(DIMENSIONS AT TRAFFIC FACE OF RAIL)

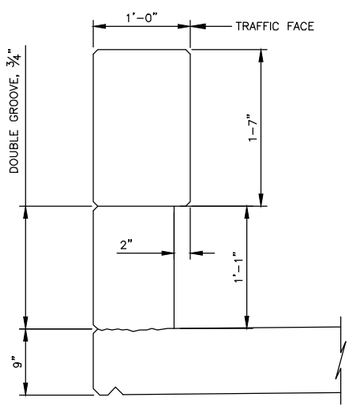



## SECTION A - A



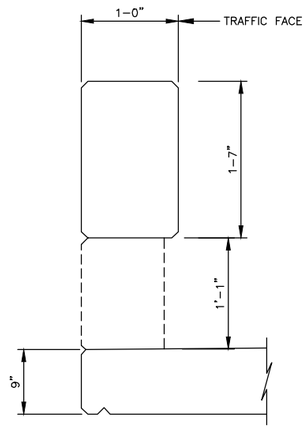

## TYPICAL SECTION BETWEEN POSTS

(SHOWING REINFORCING)




## TYPICAL INTERIOR POST

(SHOWING DIMENSIONS)




## TYPICAL SECTION BETWEEN POSTS

(SHOWING DIMENSIONS)

NOTES:

1. REINFORCING STEEL AND CONCRETE FOR KANSAS CORRAL RAIL ARE QUANTIFIED ON SHEET 27.
2. * THE HOOK MAY BE CANTED TO PROVIDE CLEARANCE AND/OR FIT BETWEEN REINFORCING.

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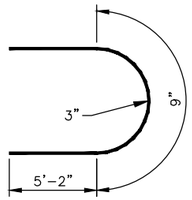
CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09-129-26.1
CONCRETE BARRIER DETAILS
PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

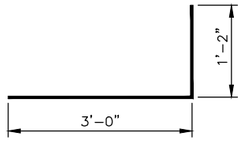
H:\Fargo\VBN\6000\6006\13_6006_061 TB1204\CAD\Plans\CONCRETE BARRIER DETAILS.dwg 11x17 12/23/2014 3:33 PM (cwagner)

23 USC § 409 Documents
NDDOT Reserves All Objections

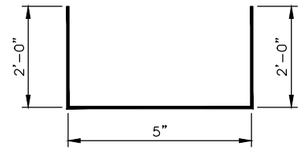
| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 27 | 37 |



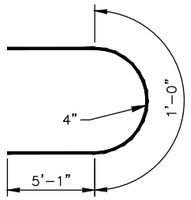

**R401E**




**R704E**




**R508E**

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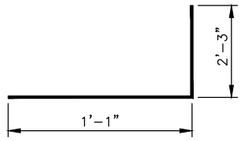
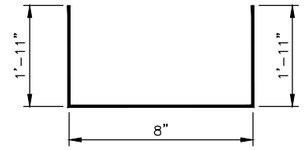
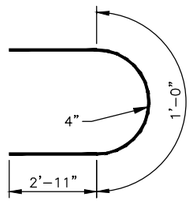


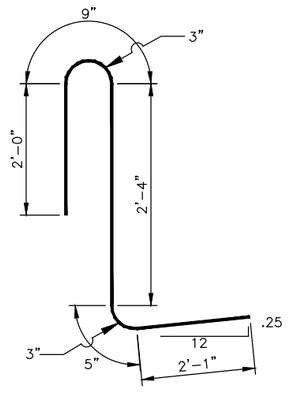

**R305E**



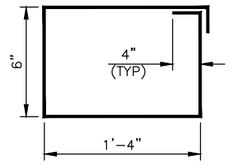

**R309E**



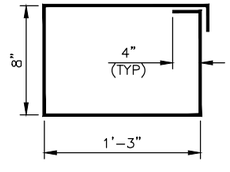

**R503E**




**R706E**




**R310E**




**R311E**

## BENT BAR DETAILS

NOTES:

1. THE ESTIMATED MATERIAL QUANTITIES SHOWN ARE FOR INFORMATION PURPOSES ONLY. ALL MATERIALS, INCLUDING CONCRETE & REINFORCING BARS, AND ALL LABOR REQUIRED TO BUILD THE KANSAS CORRAL RAIL OVER THE DECK SHALL BE INCLUDED IN THE PAY ITEM, "CONCRETE BRIDGE BARRIER". ESTIMATED REINFORCING AND CONCRETE QUANTITIES LISTED ARE FOR BOTH RAILS AND INFORMATIONAL PURPOSES ONLY.
2. FABRICATION AND TOLERANCES SHALL BE IN ACCORDANCE WITH THE CRSI MANUAL OF STANDARD PRACTICE.
3. ALL DIMENSIONS ARE OUT TO OUT OF BARS.
4. NOMINAL LENGTH OF EACH BENT BAR OR CUT BAR IS THE SUM TOTAL OF THE DETAILING DIMENSIONS FOR THAT BAR, UNLESS OTHERWISE NOTED.
5. THE GIVEN DIMENSION FOR ALL BENDS ARE THE BEND RADII.
6. AN "E" FOLLOWING A BAR DESIGNATION INDICATES AN EPOXY COATED BAR.
7. THE CONCRETE FOR BRIDGE BARRIER SHALL BE CLASS AAE–3 AND THE REINFORCING STEEL SHALL BE GRADE 60.

BILL OF REINFORCEMENT (ONE RAIL)

| MARK | NO. | SIZE | LENGTH | SHAPE |
|---|---|---|---|---|
| R401E | 2 | 4 | 11' - 1" | BENT |
| R502E | 4 | 5 | 11' - 2" | BENT |
| R503E | 4 | 5 | 6' - 10" | BENT |
| R704E | 2 | 7 | 4' - 2" | BENT |
| R305E | 178 | 3 | 3' - 4" | BENT |
| R706E | 178 | 7 | 7' - 7" | BENT |
| R707E | 114 | 7 | 9' - 8" | STRT. |
| R508E | 104 | 5 | 4' - 5" | BENT |
| R309E | 160 | 3 | 4' - 6" | BENT |
| R310E | 285 | 3 | 4' - 4" | BENT |
| R311E | 40 | 3 | 4' - 6" | BENT |
| R712E | 12 | 7 | 9' - 4" | STRT. |

| QUANTITIES & PROPERTIES (PER RAIL) (FOR INFORMATION PURPOSES ONLY) | |
|---|---|
| CLASS AAE–3 CONCRETE | 14.9 CY |
| CONCRETE STRENGTH | 4,000 PSI |
| REINFORCING STEEL | 6,852 LBS |
| REINFORCEMENT STRENGTH | 60,000 PSI |

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09–129–26.1
CONCRETE BARRIER REBAR DETAILS
PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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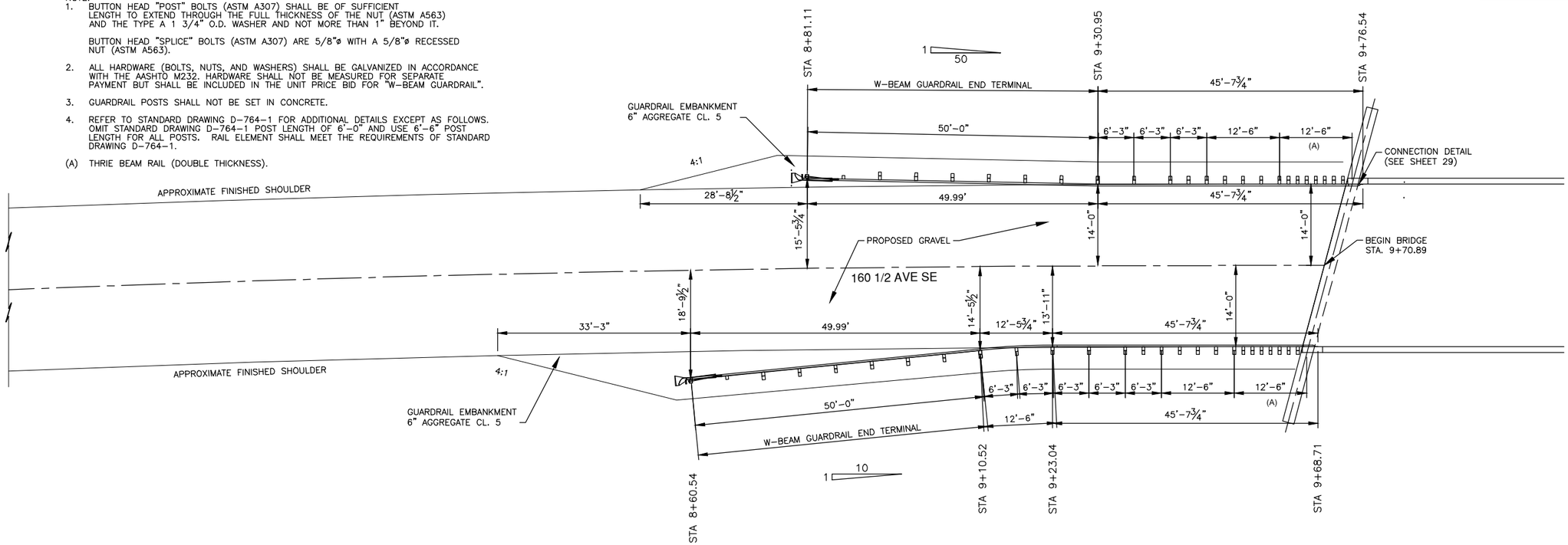
| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 28 | 37 |

NOTE:
1. BUTTON HEAD "POST" BOLTS (ASTM A307) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND THE TYPE A 1 3/4" O.D. WASHER AND NOT MORE THAN 1" BEYOND IT.

   BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE 5/8"ø WITH A 5/8"ø RECESSED NUT (ASTM A563).
2. ALL HARDWARE (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH THE AASHTO M232. HARDWARE SHALL NOT BE MEASURED FOR SEPARATE PAYMENT BUT SHALL BE INCLUDED IN THE UNIT PRICE BID FOR "W-BEAM GUARDRAIL".
3. GUARDRAIL POSTS SHALL NOT BE SET IN CONCRETE.
4. REFER TO STANDARD DRAWING D-764-1 FOR ADDITIONAL DETAILS EXCEPT AS FOLLOWS. OMIT STANDARD DRAWING D-764-1 POST LENGTH OF 6'-0" AND USE 6'-6" POST LENGTH FOR ALL POSTS. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF STANDARD DRAWING D-764-1.

(A) THRIE BEAM RAIL (DOUBLE THICKNESS).

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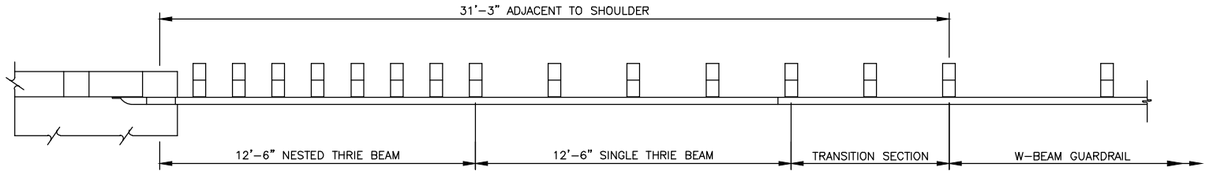
CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER

BRIDGE NO. 09-129-26.1

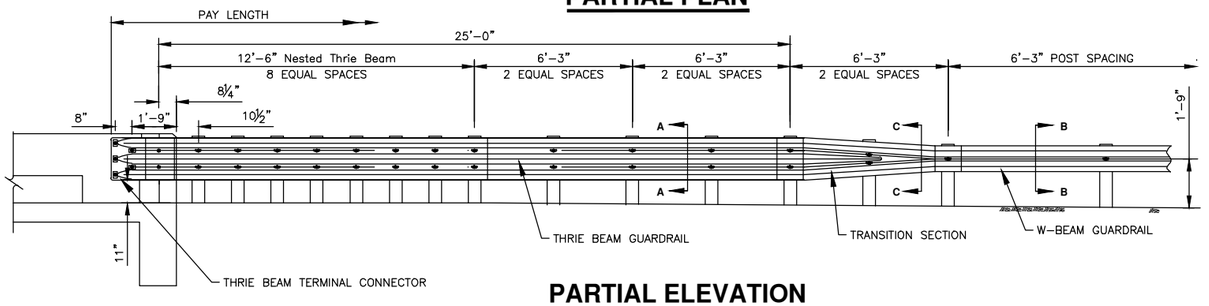
# GUARDRAIL DETAIL

PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 29 | 37 |




## PARTIAL PLAN




## PARTIAL ELEVATION

GENERAL NOTES:

RAIL ELEMENT SHALL BE #10 OR #12 U.S. STANDARD GAUGE EXCEPT WHERE SPECIFIC GAUGE IS REQUIRED, SUCH AS AT END TERMINAL OR BULLNOSE SECTIONS.

GALVANIZED STEEL RAIL ELEMENTS SHALL BE USED. ALL POST RAIL FITTINGS AND ANCHOR BOLTS SHALL BE GALVANIZED IN ACCORDANCE WITH STANDARD SPECIFICATIONS.

GUARDRAIL PARTS FURNISHED UNDER THIS SPECIFICATION SHALL BE INTERCHANGEABLE WITH SIMILAR PARTS REGARDLESS OF THE SOURCE OR MANUFACTURER.

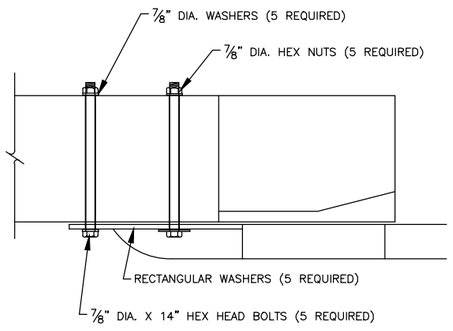
WHEN RADIUS IS LESS THAN 150', RAILS ARE TO BE SHOP CURVED.

TERMINAL CONNECTOR SHALL BE 10 GAUGE STEEL. THE CONNECTOR HAS THE SAME SECTION AS THRIE BEAM GUARDRAIL. TERMINAL CONNECTOR SHALL BE SUBSIDIARY TO THE BID ITEM "W–BEAM GUARDRAIL".

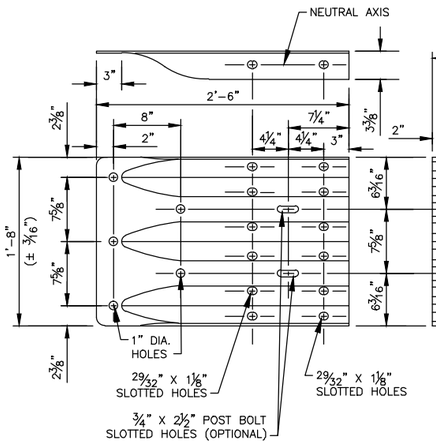
ALL GUARDRAIL SPLICES, INCLUDING SPECIAL END SHOES, SHALL BE LAPPED IN THE DIRECTION OF TRAFFIC. WHERE TRAFFIC IS TEMPORARILY CARRIED IN THE DIRECTION OPPOSITE OF THE FINAL CONFIGURATION, THE RAIL SPLICES SHALL BE LAPPED IN THE DIRECTION OF THE PERMANENT TRAFFIC.

BRIDGE RAIL TRANSITION SHALL CONSIST OF ONE 25'–0" THRIE BEAM SECTION, ONE 12'–6" THRIE BEAM SECTION NESTED IN BACK OF 25'–0" SECTION, AND ONE THRIE BEAM TO W–BEAM TRANSITION SECTION, POSTS LOCATED AS SHOWN, AND ALL ASSOCIATED HARDWARE. THE REMAINDER OF THE GUARDRAIL SHALL BE W–BEAM WITH 6'–3" POST SPACING AND MAY BE FURNISHED IN EITHER 12'–6" OR 25'–0" SECTIONS.

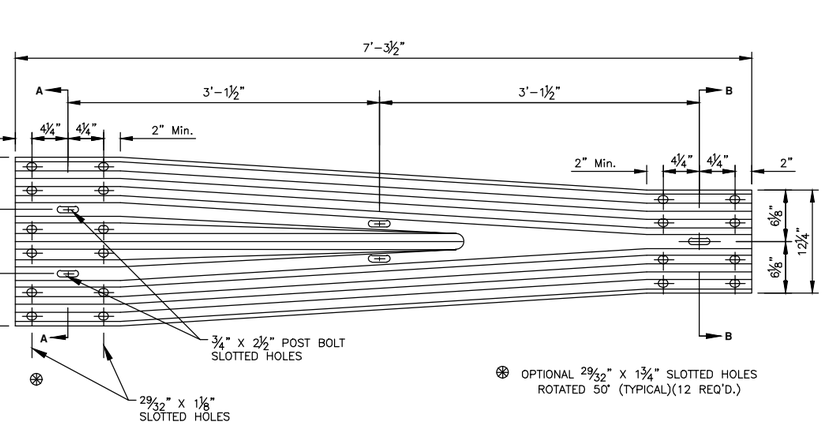
ALL MATERIAL AND WORK REQUIRED FOR THIS CONSTRUCTION SHALL BE INCLUDED IN THE PAY ITEM "W–BEAM GUARDRAIL."




## DETAIL BRIDGE ATTACHMENT

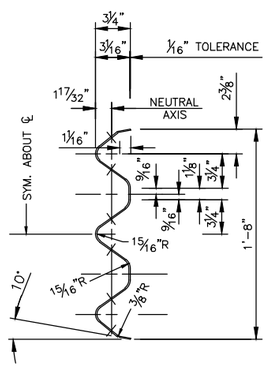



## TERMINAL CONNECTOR



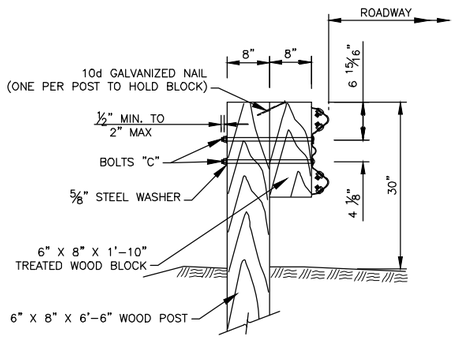

## ELEVATION - TRANSITION SECTION

(FROM THRIE BEAM TO W–BEAM RAIL)

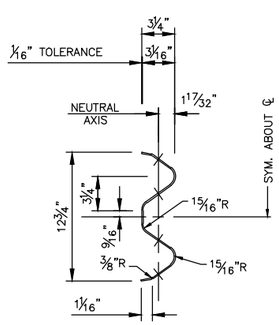



## SECTION A-A THRU RAIL ELEMENT

TYPICAL THRIE BEAM

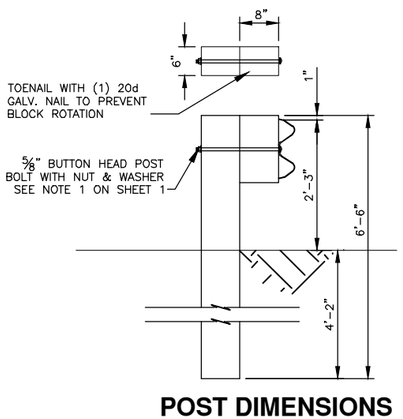



## SECTION C-C (WOOD POST)

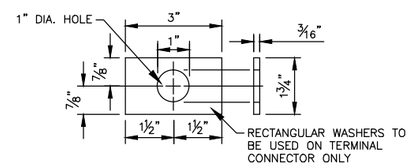



## SECTION B-B THRU RAIL ELEMENT

TYPICAL W–BEAM




## POST DIMENSIONS




## RECTANGULAR WASHER

(OTHER APPROVED WASHER MAY BE USED)

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER

BRIDGE NO. 09–129–26.1

GUARDRAIL TRANSITION

PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 30 | 37 |

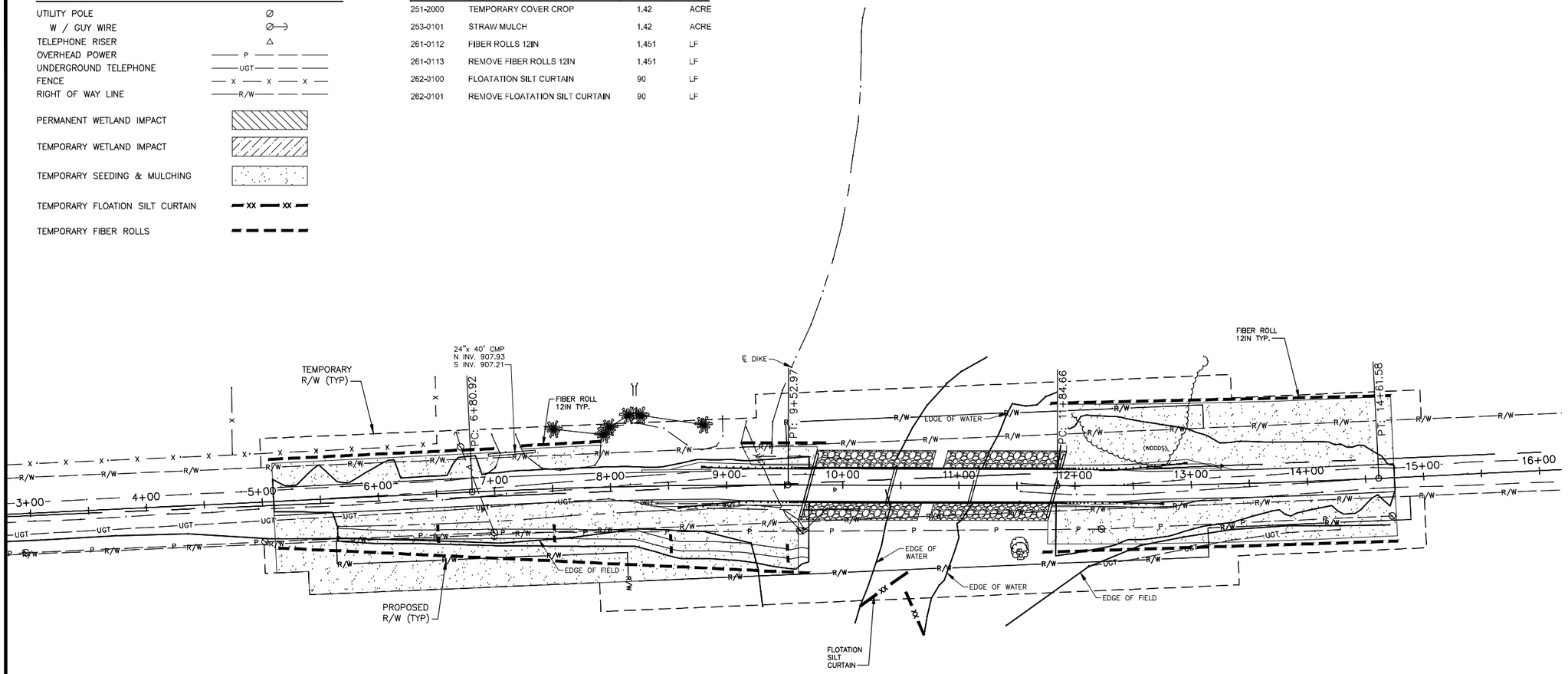
## LEGEND

- UTILITY POLE
- W / GUY WIRE
- TELEPHONE RISER
- OVERHEAD POWER
- UNDERGROUND TELEPHONE
- FENCE
- RIGHT OF WAY LINE
- PERMANENT WETLAND IMPACT
- TEMPORARY WETLAND IMPACT
- TEMPORARY SEEDING & MULCHING
- TEMPORARY FLOATION SILT CURTAIN
- TEMPORARY FIBER ROLLS

| ITEM | DESCRIPTION | QUANTITY | UNIT |
|---|---|---|---|
| 251-2000 | TEMPORARY COVER CROP | 1.42 | ACRE |
| 253-0101 | STRAW MULCH | 1.42 | ACRE |
| 261-0112 | FIBER ROLLS 12IN | 1,451 | LF |
| 261-0113 | REMOVE FIBER ROLLS 12IN | 1,451 | LF |
| 262-0100 | FLOATATION SILT CURTAIN | 90 | LF |
| 262-0101 | REMOVE FLOATATION SILT CURTAIN | 90 | LF |

N

50 0 50 100
Scale Feet

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09–129–26.1
# TEMPORARY EROSION CONTROL
PROJECT NO. BRO-0009(044)
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

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| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 31 | 37 |

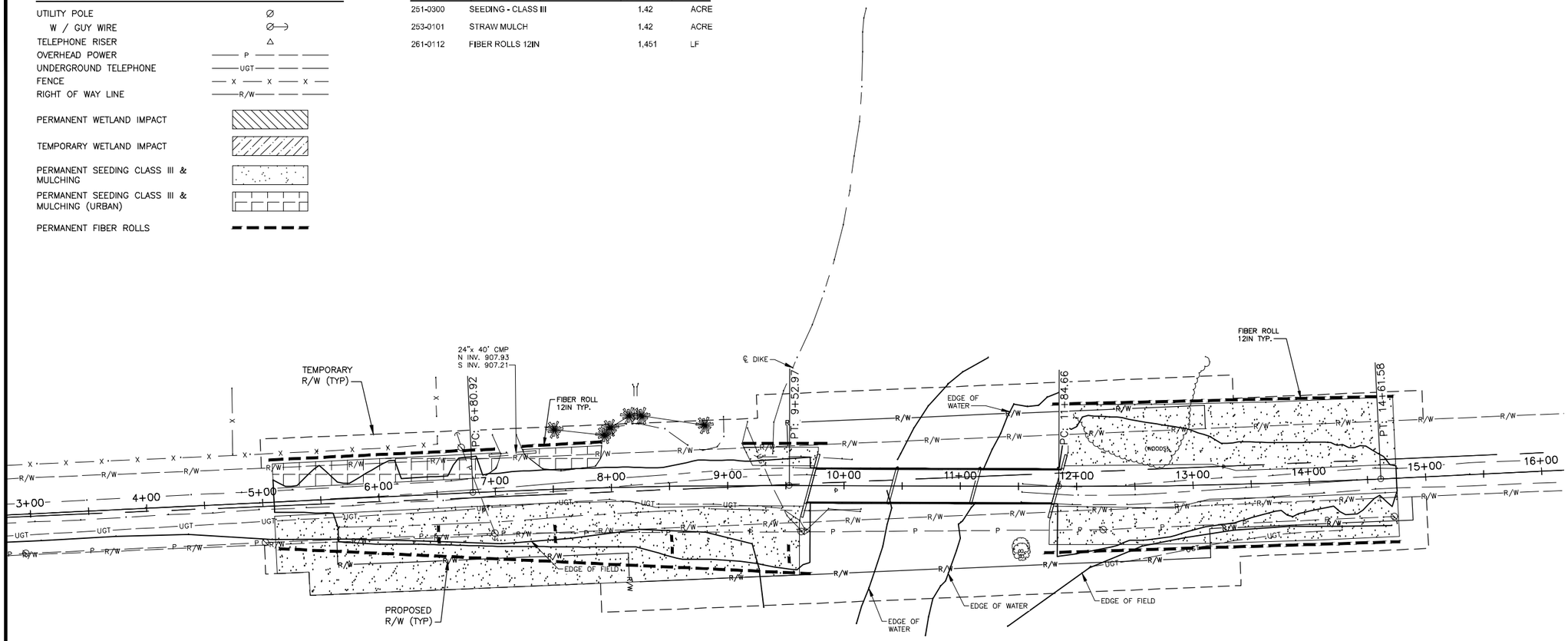
## LEGEND

- UTILITY POLE
- W / GUY WIRE
- TELEPHONE RISER
- OVERHEAD POWER — P —
- UNDERGROUND TELEPHONE — UGT —
- FENCE — X — X — X —
- RIGHT OF WAY LINE — R/W —
- PERMANENT WETLAND IMPACT
- TEMPORARY WETLAND IMPACT
- PERMANENT SEEDING CLASS III & MULCHING
- PERMANENT SEEDING CLASS III & MULCHING (URBAN)
- PERMANENT FIBER ROLLS

| ITEM | DESCRIPTION | QUANTITY | UNIT |
|---|---|---|---|
| 251-0300 | SEEDING - CLASS III | 1.42 | ACRE |
| 253-0101 | STRAW MULCH | 1.42 | ACRE |
| 261-0112 | FIBER ROLLS 12IN | 1,451 | LF |

N

50 0 50 100
Scale Feet

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CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER

BRIDGE NO. 09–129–26.1

# PERMANENT EROSION CONTROL

PROJECT NO. **BRO-0009(044)**

160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

H:\Fargo_ABN\6000\6006\13_6006_061 TB1204\CAD\Plans\WETLAND IMPACT PERM.dwg-EC PERM-12/29/2014 4:23 PM-(druud)

| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 32 | 37 |


N

1000 0 1000 2000
Scale Feet

(A) BRIDGE OUT XX MILES AHEAD LOCAL TRAFFIC ONLY – 2
R11–3b–60
BARRICADE MOUNTED

(B) ROAD CLOSED 1000 FT – 2
W20–3–48
POST MOUNTED

(C) ROAD CLOSED 500 FT – 2
W20–3–48
POST MOUNTED

(D) ROAD CLOSED – 2
R11–2–48
BARRICADE MOUNTED

This document was originally issued and sealed by Jeremy L. McLaughlin Registration Number PE- 4883, on 12/24/14 and the original document is stored at Cass County Highway Department

CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09–129–26.1
**TRAFFIC CONTROL**
PROJECT NO. **BRO-0009(044)**
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

H:\Fargo\JBN\6000\6006\13_6006_061 TB120A\CAD\Plans\TRAFFIC CONTROL.dwg TRAFFIC CONTROL-12/23/2014 3:33 PM (cwagner)

| PROJECT NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|
| BRO-0009(044) | 33 | 37 |

| SIGN NUMBER | SIGN SIZE | DESCRIPTION | AMOUNT REQUIRED | UNITS PER AMOUNT | UNITS SUB TOTAL |
|---|---|---|---|---|---|
| D3-36 | 36"x6" | STREET NAME SIGN (Sign and installation only) | | 6 | |
| G20-1a-60 | 60"x24" | ROAD WORK NEXT __ MILES | | 34 | |
| G20-1b-60 | 60"x24" | WORK IN PROGRESS/ NO WORK IN PROGRESS (Sign and installation only) | | 26 | |
| G20-2a-48 | 48"x24" | END ROAD WORK | | 19 | |
| G20-4-36 | 36"x18" | PILOT CAR FOLLOW ME | | 18 | |
| G20-10-108 | 108"x48" | CONTRACTOR SIGN | | 64 | |
| G20-50a-72 | 72"x36" | ROAD WORK NEXT __ MILES RT & LT ARROWS | | 37 | |
| G20-52a-72 | 72"x24" | ROAD WORK NEXT __ MILES RT or LT ARROW | | 30 | |
| G20-55-96 | 96"x48" | SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT | | 59 | |
| M1-1-36 | 36"x36" | INTERSTATE ROUTE MARKER (Post and installation only) | | 10 | |
| M1-4-24 | 24"x24" | U.S. ROUTE MARKER (Post and installation only) | | 10 | |
| M1-5-24 | 24"x24" | STATE ROUTE MARKER (Post and installation only) | | 10 | |
| M3-1-24 | 24"x12" | NORTH (Mounted on route marker post) | | 7 | |
| M3-2-24 | 24"x12" | EAST (Mounted on route marker post) | | 7 | |
| M3-3-24 | 24"x12" | SOUTH (Mounted on route marker post) | | 7 | |
| M3-4-24 | 24"x12" | WEST (Mounted on route marker post) | | 7 | |
| M4-8-24 | 24"x12" | DETOUR (Mounted on route marker post) | | 7 | |
| M4-9-30 | 30"x24" | DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT | | 15 | |
| M4-10-48 | 48"x18" | DETOUR ARROW RIGHT or LEFT | | 23 | |
| M5-1-21 | 21"x15" | ARROW AHD AND RT or LT(Mounted on route marker post) | | 7 | |
| M5-2-21 | 21"x15" | ARROW AHD UP & RT or LT (Mounted on route marker post) | | 7 | |
| M6-1-21 | 21"x15" | ARROW RT or LT (Mounted on route marker post) | | 7 | |
| M6-2-21 | 21"x15" | ARROW UP & RT or LT (Mounted on route marker post) | | 7 | |
| M6-3-21 | 21"x15" | ARROW AHD (Mounted on route marker post) | | 7 | |
| R1-1-48 | 48"x48" | STOP | | 32 | |
| R1-1a-18 | 18"x18" | STOP and SLOW PADDLE Back to Back | | 5 | |
| R1-2-60 | 60"x60" | YIELD | | 29 | |
| R2-1-48 | 48"x60" | SPEED LIMIT __ | | 39 | |
| R2-1a-24 | 24"x18" | MINIMUM FEE $80 (Mounted on Speed Limit post) | | 10 | |
| R3-7-48 | 48"x48" | LEFT or RIGHT LANE MUST TURN LEFT or RIGHT | | 35 | |
| R4-1-48 | 48"x60" | DO NOT PASS | | 39 | |
| R4-7-48 | 48"x60" | KEEP RIGHT SYMBOL | | 39 | |
| R5-1-48 | 48"x48" | DO NOT ENTER | | 35 | |
| R6-1-36 | 36"x12" | ONE WAY RIGHT or LEFT | | 13 | |
| R7-1-12 | 12"x18" | NO PARKING | | 11 | |
| R10-6-24 | 24"x36" | STOP HERE ON RED | | 16 | |
| **R11-2-48** | **48"x30"** | **ROAD CLOSED** | **2** | **28** | **56** |
| R11-2a-48 | 48"x30" | STREET CLOSED | | 28 | |
| **R11-3b-60** | **60"x30"** | **BRIDGE OUT __ MILES AHEAD LOCAL TRAFFIC ONLY** | **2** | **31** | **62** |
| R11-3c-60 | 60"x30" | STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY | | 31 | |
| R11-4a-60 | 60"x30" | STREET CLOSED TO THRU TRAFFIC | | 31 | |
| W1-3-48 | 48"x48" | RIGHT or LEFT SHARP REVERSE CURVE ARROW | | 35 | |
| W1-4-48 | 48"x48" | RIGHT or LEFT REVERSE CURVE ARROW | | 35 | |
| W1-4b-48 | 48"x48" | DOUBLE RIGHT or LEFT REVERSE CURVE ARROW | | 35 | |
| W1-6-48 | 48"x24" | LARGE ARROW | | 26 | |
| W3-1-48 | 48"x48" | STOP AHEAD SYMBOL | | 35 | |
| W3-3-48 | 48"x48" | SIGNAL AHEAD SYMBOL | | 35 | |
| W3-4-48 | 48"x48" | BE PREPARED TO STOP | | 35 | |
| W3-5-48 | 48"x48" | SPEED REDUCTION AHEAD | | 35 | |
| W4-2-48 | 48"x48" | RIGHT or LEFT LANE TRANSITION SYMBOL | | 35 | |
| W5-1-48 | 48"x48" | ROAD NARROWS | | 35 | |
| W5-8-48 | 48"x48" | THRU TRAFFIC RIGHT LANE | | 35 | |
| W5-9-48 | 48"x48" | ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW | | 35 | |
| W6-3-48 | 48"x48" | TWO WAY TRAFFIC SYMBOL | | 35 | |
| W8-1-48 | 48"x48" | BUMP | | 35 | |

| SIGN NUMBER | SIGN SIZE | DESCRIPTION | AMOUNT REQUIRED | UNITS PER AMOUNT | UNITS SUB TOTAL |
|---|---|---|---|---|---|
| W8-3-48 | 48"x48" | PAVEMENT ENDS | | 35 | |
| W8-7-48 | 48"x48" | LOOSE GRAVEL | | 35 | |
| W8-9a-48 | 48"x48" | SHOULDER DROP-OFF | | 35 | |
| W8-11-48 | 48"x48" | UNEVEN LANES | | 35 | |
| W8-12-48 | 48"x48" | NO CENTER STRIPE | | 35 | |
| W8-53-48 | 48"x48" | TRUCKS ENTERING HIGHWAY | | 35 | |
| W8-54-48 | 48"x48" | TRUCKS ENTERING AHEAD or __ FT. | | 35 | |
| W8-55-48 | 48"x48" | TRUCKS CROSSING AHEAD or __ FT. | | 35 | |
| W8-56-48 | 48"x48" | TRUCKS EXITING HIGHWAY | | 35 | |
| W9-3a-48 | 48"x48" | CENTER LANE CLOSED SYMBOL | | 35 | |
| W12-2-48 | 48"x48" | LOW CLEARANCE SYMBOL | | 35 | |
| W9-3a-48 | 48"x48" | CENTER LANE CLOSED SYMBOL | | 35 | |
| W12-2-48 | 48"x48" | LOW CLEARANCE SYMBOL | | 35 | |
| W13-1-24 | 24"x24" | __ MPH ADVISORY SPEED PLATE (Mounted on warning sign post) | | 11 | |
| W13-4-48 | 48"x60" | RAMP ARROW | | 39 | |
| W14-3-48 | 48"x36" | NO PASSING ZONE | | 23 | |
| W20-1-48 | 48"x48" | ROAD WORK AHEAD or _FT or _ MILE | | 35 | |
| W20-2-48 | 48"x48" | DETOUR AHEAD or __ FT | | 35 | |
| **W20-3-48** | **48"x48"** | **ROAD or STREET CLOSED AHEAD or __ FT.** | **4** | **35** | **140** |
| W20-4-48 | 48"x48" | ONE LANE ROAD AHEAD or __ FT. | | 35 | |
| W20-5-48 | 48"x48" | RIGHT or LEFT LANE CLOSED AHEAD or __ FT. | | 35 | |
| W20-7a-48 | 48"x48" | FLAGGING SYMBOL | | 35 | |
| W20-7k-24 | 24"x18" | __ FEET (Mounted on warning sign post) | | 10 | |
| W20-8-48 | 48"x48" | STREET CLOSED | | 35 | |
| W20-51-48 | 48"x48" | EQUIPMENT WORKING | | 35 | |
| W20-52-54 | 54"x12" | NEXT __ MILES (Mounted on warning sign post) | | 12 | |
| W21-1a-48 | 48"x48" | WORKERS SYMBOL | | 35 | |
| W21-2-48 | 48"x48" | FRESH OIL | | 35 | |
| W21-3-48 | 48"x48" | ROAD MACHINERY AHEAD or __ FT | | 35 | |
| W21-5-48 | 48"x48" | SHOULDER WORK | | 35 | |
| W21-5a-48 | 48"x48" | RIGHT or LEFT SHOULDER CLOSED | | 35 | |
| W21-5b-48 | 48"x48" | RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT. | | 35 | |
| W21-6a-48 | 48"x48" | SURVEY CREW AHEAD | | 35 | |
| W21-50-48 | 48"x48" | BRIDGE PAINTING AHEAD or __ FT. | | 35 | |
| W21-51-48 | 48"x48" | MATERIAL ON ROADWAY | | 35 | |
| W22-8-48 | 48"x48" | FRESH OIL LOOSE ROCK | | 35 | |
| | 24"x24" | TAKE TURNS (6" D letters) (Mounted on stop sign post) | | 11 | |
| | | | | | |

**SPECIAL SIGNS**

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**SPEC & CODE**

| | | |
|---|---|---|
| **704-1000** | **TRAFFIC CONTROL SIGNS** | **258** |

| SPEC & CODE | DESCRIPTION | UNIT | QUANTITY |
|---|---|---|---|
| 704-0100 | FLAGGING | MHR | |
| 704-1041 | ATTENUATION DEVICE-TYPE B-55 | EACH | |
| 704-1043 | ATTENUATION DEVICE-TYPE B-65 | EACH | |
| 704-1044 | ATTENUATION DEVICE-TYPE B-70 | EACH | |
| 704-1050 | TYPE I BARRICADES | EACH | |
| 704-1051 | TYPE II BARRICADES | EACH | |
| **704-1052** | **TYPE III BARRICADES** | **EACH** | **8** |
| 704-1060 | DELINEATOR DRUMS | EACH | |
| 704-1065 | TRAFFIC CONES | EACH | |
| 704-1067 | TUBULAR MARKERS | EACH | |
| 704-1070 | DELINEATOR | EACH | |
| 704-1072 | FLEXIBLE DELINEATORS | EACH | |
| 704-1081 | VERTICAL PANELS - BACK TO BACK | EACH | |
| 704-1085 | SEQUENCING ARROW PANEL - TYPE A | EACH | |
| 704-1086 | SEQUENCING ARROW PANEL - TYPE B | EACH | |
| 704-1087 | SEQUENCING ARROW PANEL - TYPE C | EACH | |
| 704-1088 | SEQUENCING ARROW PANEL - TYPE C - CROSSOVER | EACH | |
| 704-1095 | TYPE B FLASHERS | EACH | |
| 704-3501 | PORTABLE PRECAST CONCRETE MED BARRIER | LF | |
| 704-3510 | PRECAST CONCRETE MED BARRIER - STATE FURNISHED | EACH | |
| 762-0200 | RAISED PAVEMENT MARKERS | EACH | |
| 762-0420 | SHORT TERM 4IN LINE - TYPE R | LF | |
| 762-0430 | SHORT TERM 4IN LINE - TYPE NR | LF | |
| 762-1500 | OBLITERATION OF PVMT MK | SF | |
| 772-2110 | FLASHING BEACON - POST MOUNTED | EACH | |
| | | | |
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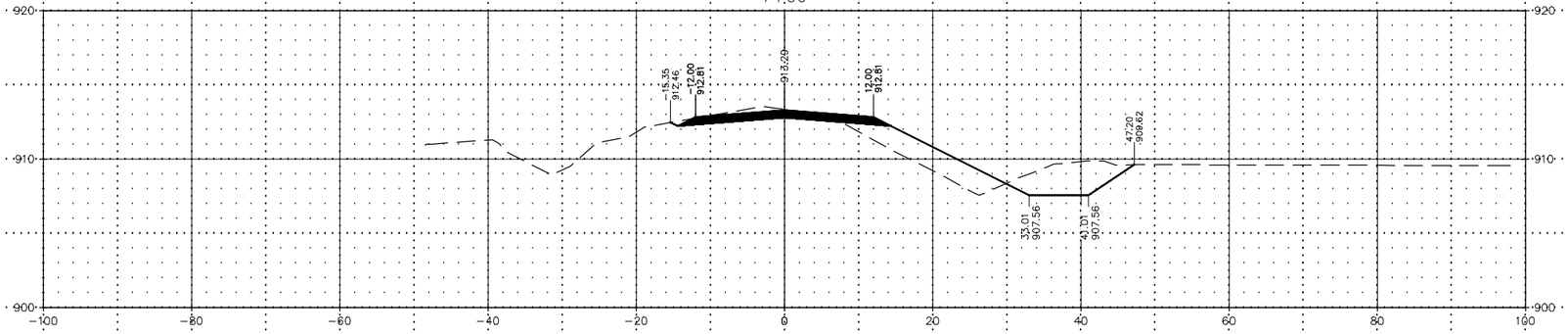
CASS COUNTY
HIGHWAY DEPARTMENT
MAPLE RIVER
BRIDGE NO. 09-129-26.1

# TRAFFIC CONTROL DEVICE LIST

PROJECT NO. **BRO-0009(044)**
160 1/2 AVENUE SE
2.5 MI SW OF MAPLETON
CASS COUNTY

H:\Fargo\JBN\6000\6006\13_6006_061 TB120A\CAD\Plans\TRAFFIC CONTROL.dwg TRAFFIC CONTROL DEVICES 12/23/2014 3:33 PM (cwagner)

7+00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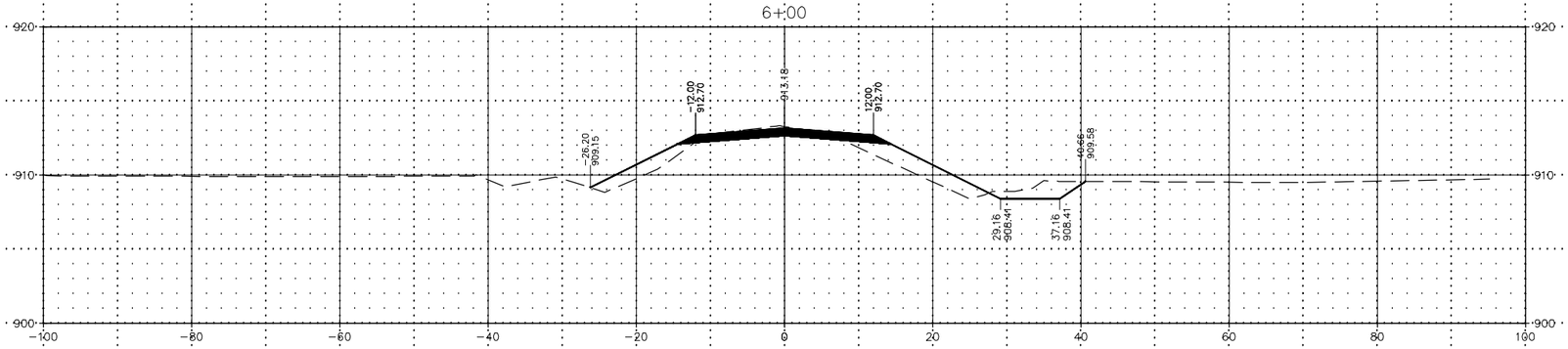
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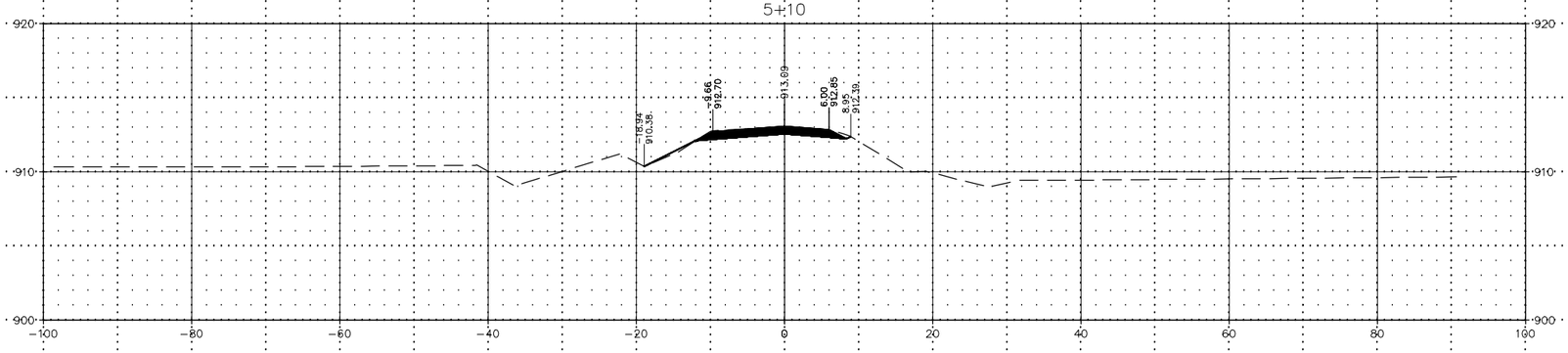
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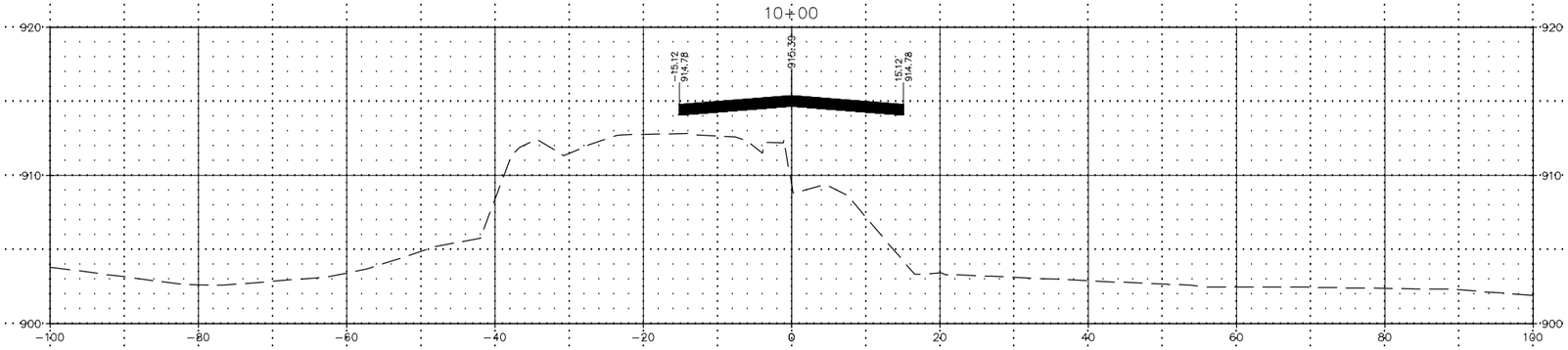
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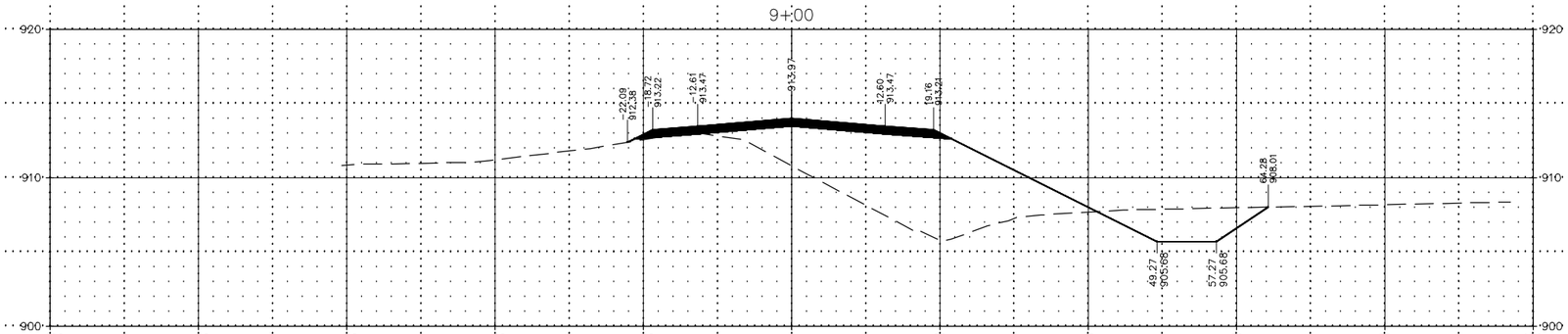
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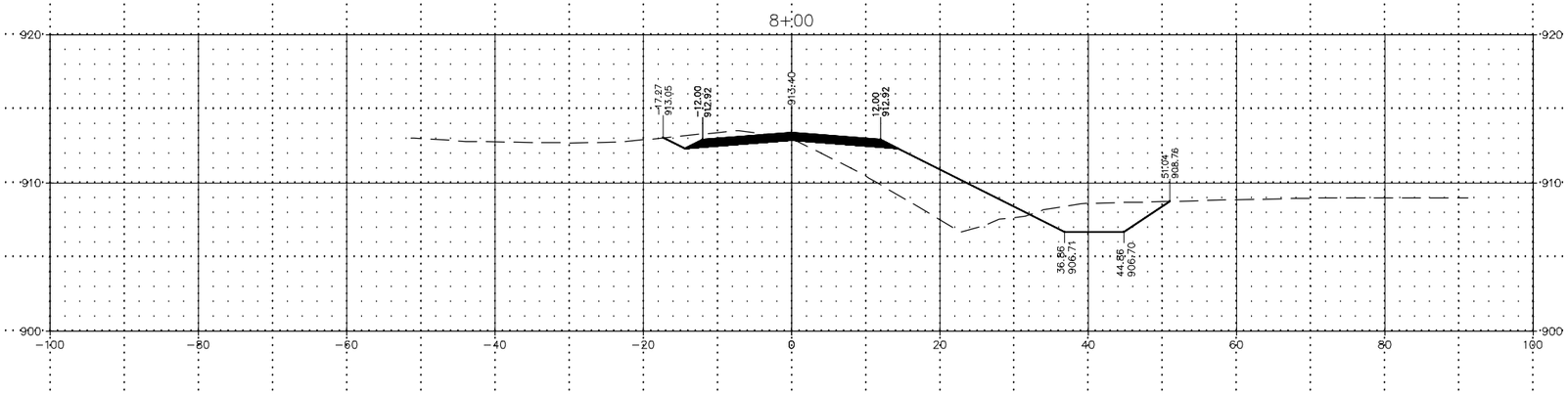
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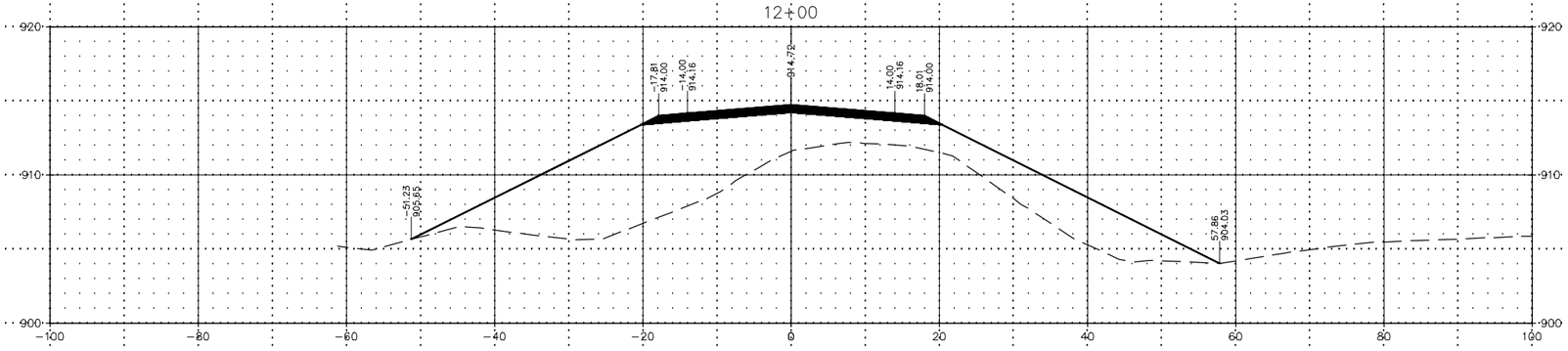
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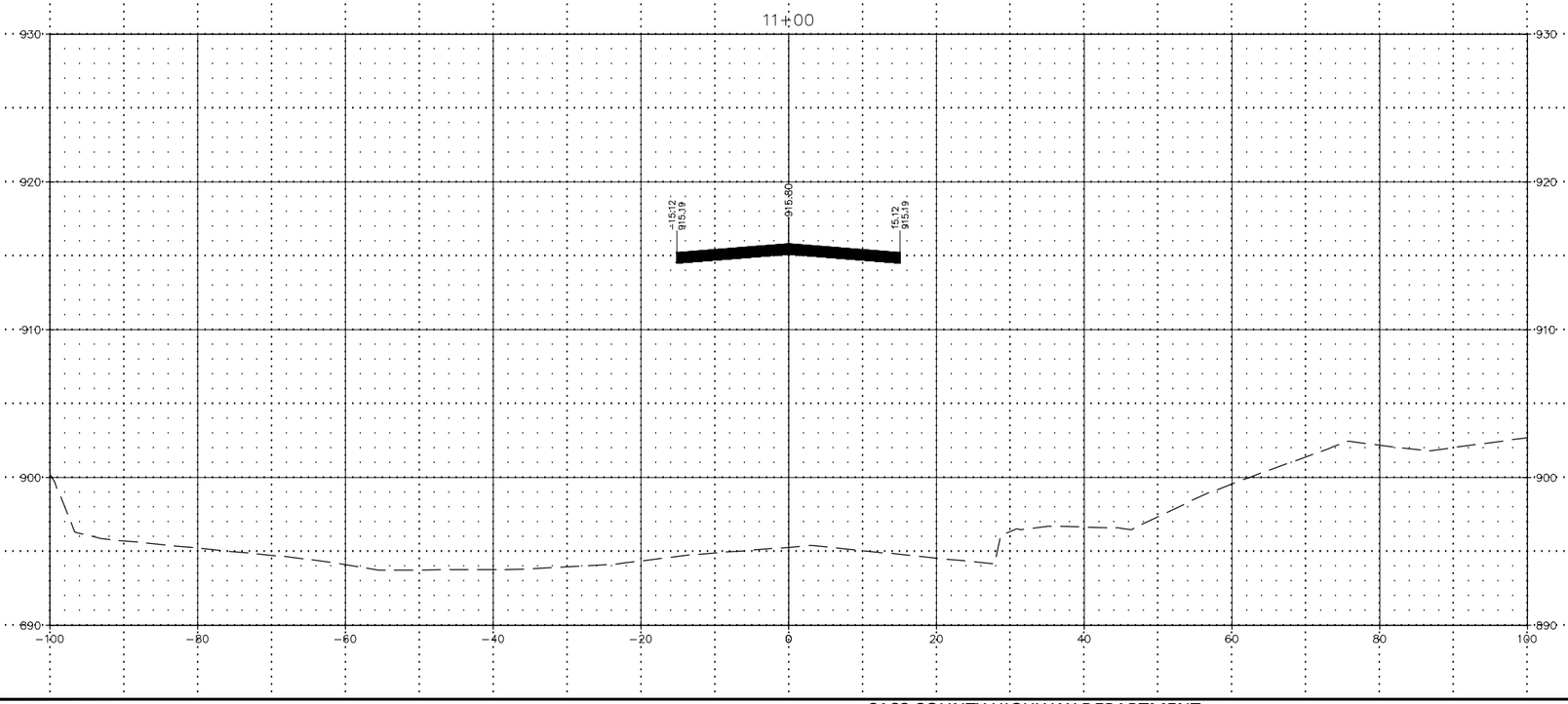
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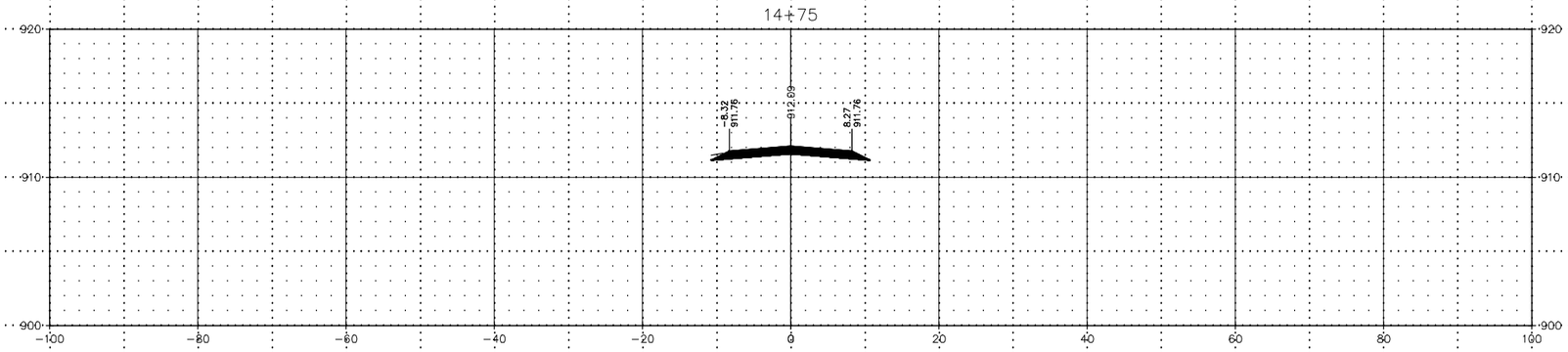
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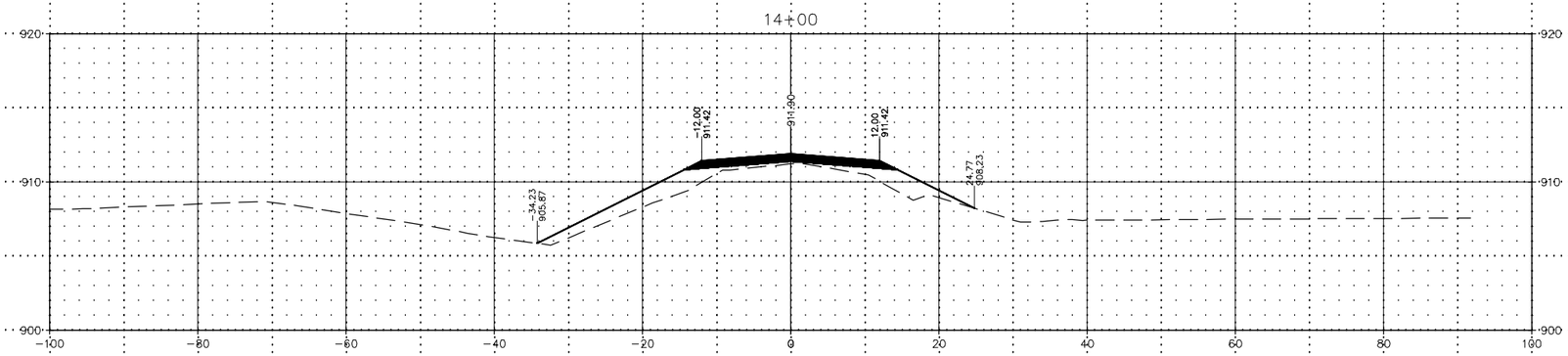
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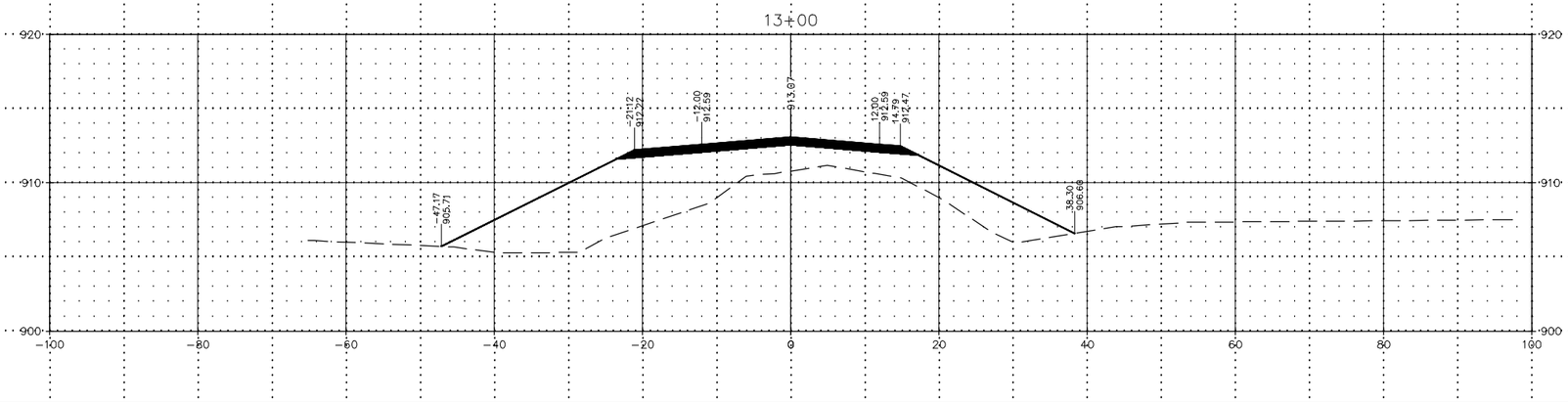
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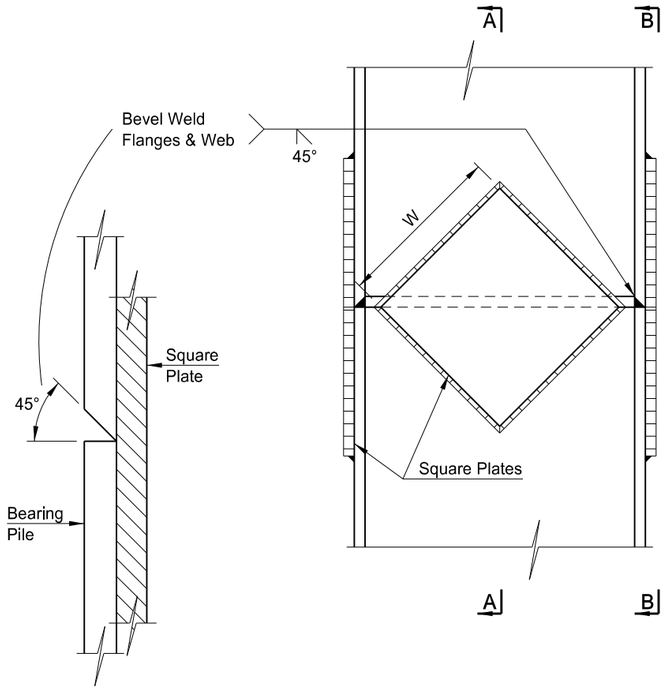
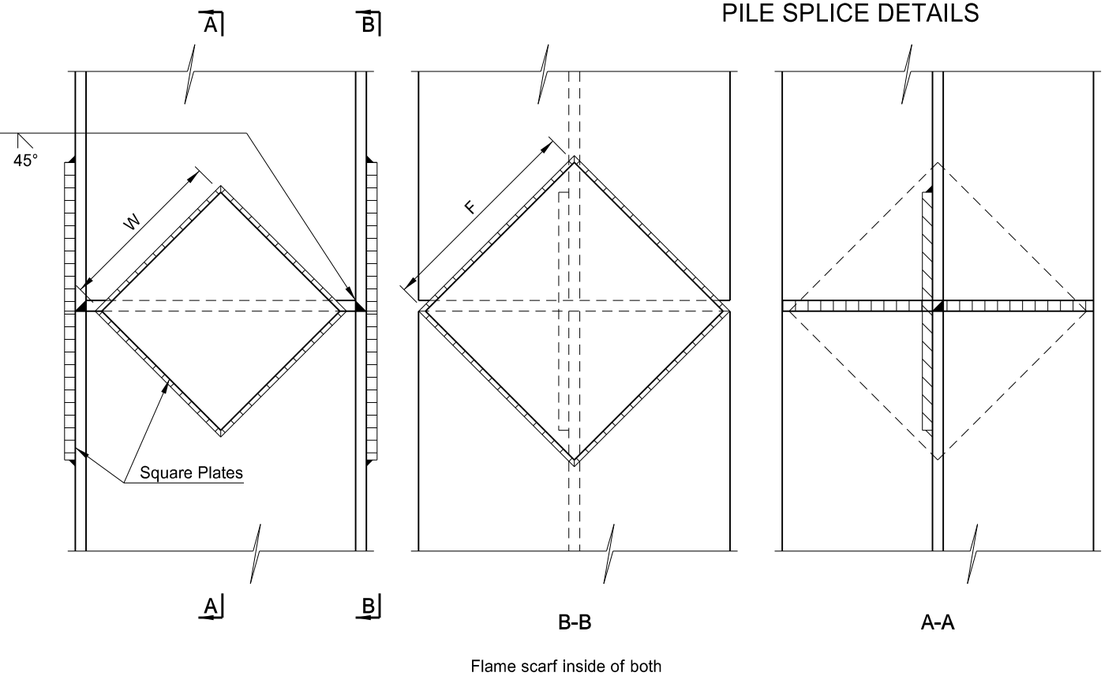
# PILE SPLICE DETAILS

D-622-1



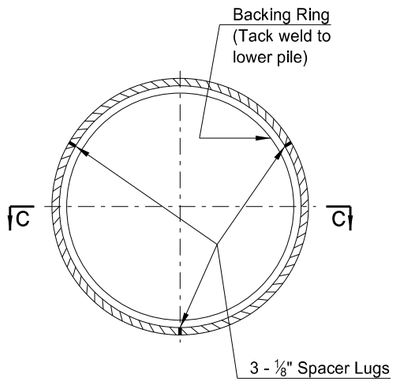

ENLARGED VIEW



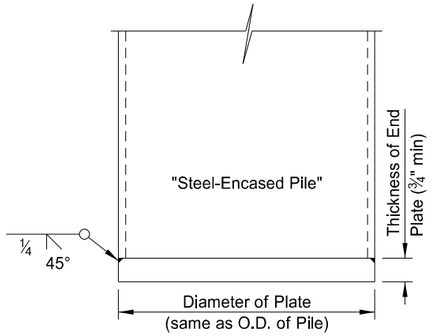

B-B

A-A

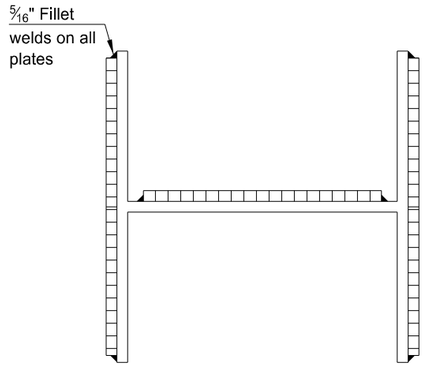
Flame scarf inside of both flanges and one side of web of upper section.




Backing Ring may be made from pile cut-offs or other material of a like quality.

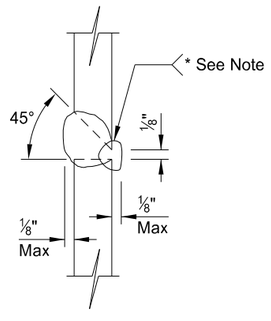



END PLATE DETAIL

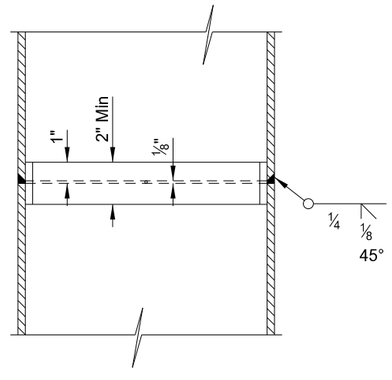



| PILE | 8" | 10" | 12" | 14" |
|---|---|---|---|---|
| "F" FLANGE | 5" | 6½" | 8" | 10" |
| "W" WEB | 4" | 5½" | 6½" | 8" |

H-PILE SPLICE DETAIL

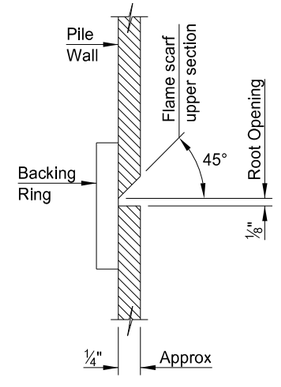



ALTERNATE H-PILE SPLICE DETAIL




C-C

STEEL-ENCASED CONCRETE PILE SPLICE DETAIL




ENLARGED VIEW

## NOTES:

Steel H-Pile may be spliced with complete penetration groove welds in both flanges and web in lieu of using the reinforcing plates.

AWS classification E7OXX Low Hydrogen Electrodes shall be used.

* Welds made without the use of backing material shall have the root gouged to sound metal and welded from the second side.

All welding shall conform to the current AASHTO/AWS D1.5 Bridge Welding Code.

The thickness of the steel square plates shall at a minimum be as thick as the flanges and web of the pile being spliced.

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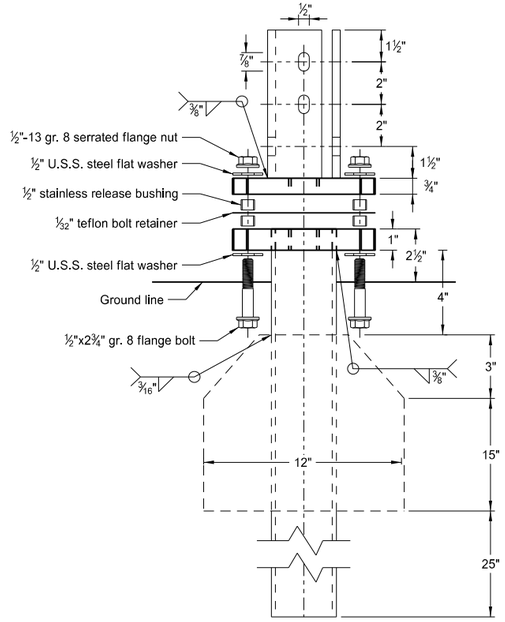
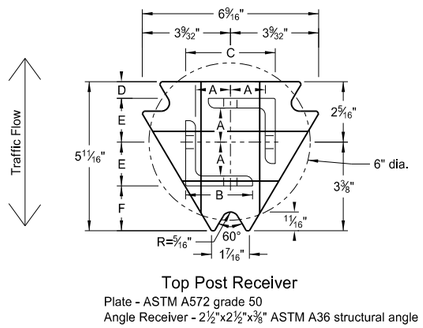
# BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

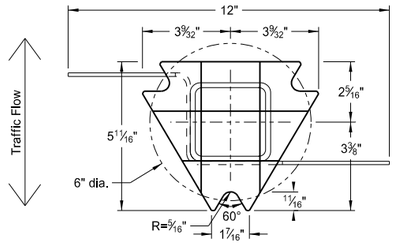



Multi-Directional
Slip Base Assembly

Perforated Tube




Top Post Receiver
Plate - ASTM A572 grade 50
Angle Receiver - 2½"x2½"x⅜" ASTM A36 structural angle




Bottom Soil Stub
Tube - 3"x3"x7 gauge ASTM A500 grade B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A1011
Plate - ASTM A572 grade 50

Notes:

1. Slip base bolts shall be torqued as specified by the manufacturer.
2. Anchor shall have a yield strength of 43.9 KSI and tensile strength of 59.3 KSI.
3. The 4" vertical clearance is required for the anchor or breakaway base. The 4"x60" measurement shall be made above and below post location and also back and ahead of the post.
4. When used in concrete sidewalk, anchor shall be same except without the wings.
5. Four post signs shall have over 7' between the first and the fourth posts.

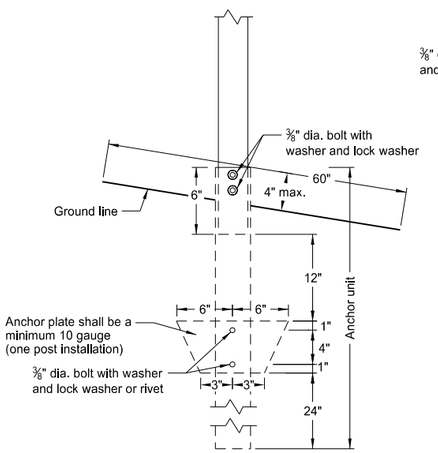
| Telescoping Perforated Tube | | | | | | |
|---|---|---|---|---|---|---|
| Number of Posts | Post Size in. | Wall Thick-ness Gauge | Sleeve Size in. | Wall Thick-ness Gauge | Slip Base | Anchor Size without Slip Base in. |
| 1 | 2 | 12 | | | No | 2¼ |
| 1 | 2¼ | 12 | | | No | 2½ |
| 1 | 2½ | 12 | | | (A) | 3 |
| 1 | 2½ | 10 | | | Yes | |
| 1 | 2¼ | 12 | 2 | 12 | Yes | |
| 1 | 2½ | 12 | 2¼ | 12 | Yes | |
| 2 | 2 | 12 | | | No | 2¼ |
| 2 | 2¼ | 12 | | | No | 2½ |
| 2 | 2½ | 12 | | | Yes | |
| 2 | 2½ | 12 | | | Yes | |
| 2 | 2¼ | 10 | 2 | 12 | Yes | |
| 2 | 2½ | 12 | 2¼ | 12 | Yes | |
| 3 & 4 | 2½ | 12 | | | Yes | |
| 3 & 4 | 2½ | 10 | | | Yes | |
| 3 & 4 | 2½ | 12 | 2¼ | 12 | Yes | |
| 3 & 4 | 2¼ | 12 | 2 | 12 | Yes | |
| 3 & 4 | 2½ | 10 | 2³⁄₁₆ | 10 | Yes | |

| Properties of Telescoping Perforated Tube | | | | | | |
|---|---|---|---|---|---|---|
| Tube Size in. | Wall Thickness in. | U.S. Standard Gauge | Weight per Foot lbs. | Moment of Inertia $in.^4$ | Cross Sec. Area $in.^2$ | Section Modulus $in.^3$ |
| 1½ x 1½ | 0.105 | 12 | 1.702 | 0.129 | 0.380 | 0.172 |
| 2 x 2 | 0.105 | 12 | 2.416 | 0.372 | 0.590 | 0.372 |
| 2¼ x 2¼ | 0.105 | 12 | 2.773 | 0.561 | 0.695 | 0.499 |
| 2³⁄₁₆ x 2³⁄₁₆ | 0.135 | 10 | 3.432 | 0.605 | 0.841 | 0.590 |
| 2½ x 2½ | 0.105 | 12 | 3.141 | 0.804 | 0.803 | 0.643 |
| 2½ x 2½ | 0.135 | 10 | 4.006 | 0.979 | 1.010 | 0.785 |

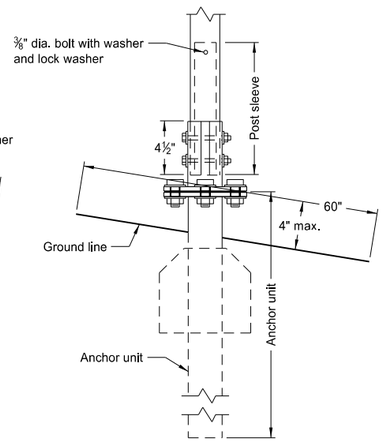
| Top Post Receiver Data Table | | | | | | |
|---|---|---|---|---|---|---|
| Square Post Sizes (B) | A | B | C | D | E | F |
| 2³⁄₁₆"x10 ga. | 1⁹⁄₆₄" | 2½" | 3¹⁄₃₂" | 25⁄₃₂" | 1³³⁄₆₄" | 1⅞" |
| 2½"x10 ga. | 1⁹⁄₃₂" | 2½" | 3⁵⁄₁₆" | ⅝" | 1²¹⁄₃₂" | 1¾" |

(A) The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak.

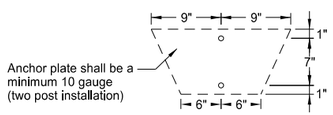
(B) The 2³⁄₁₆"x10 ga. may be inserted into 2½"x10 ga. for additional wind load.

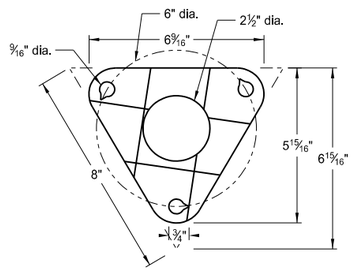



Anchor Unit and Post Assembly




Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly




Bolt Retainer for Base Connection
Bolt Retainer- ¹⁄₃₂" Reprocessed Teflon

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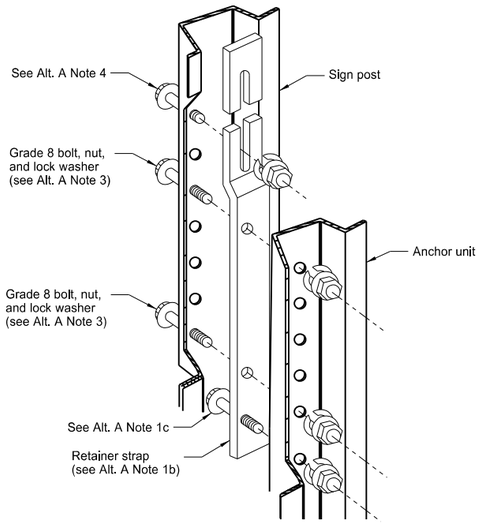
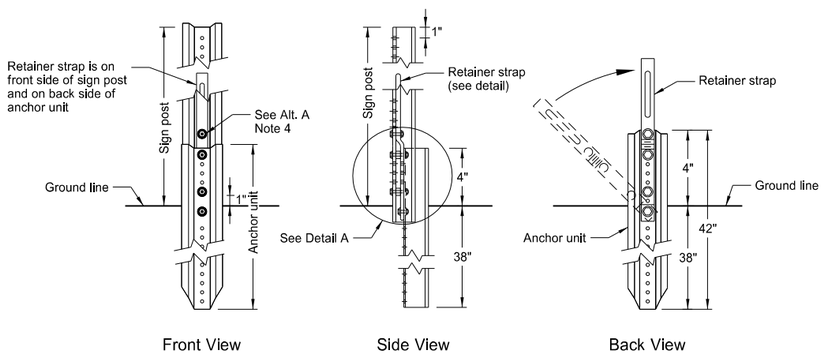
# BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

## U-Channel Post



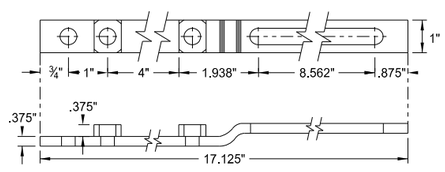

Detail A



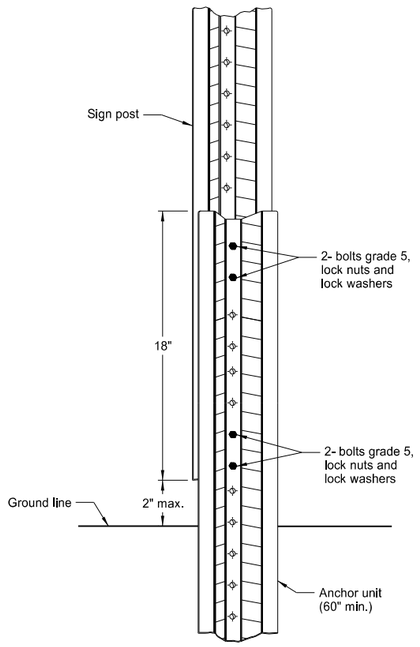

Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

A maximum of 2 posts shall be installed within 7'.

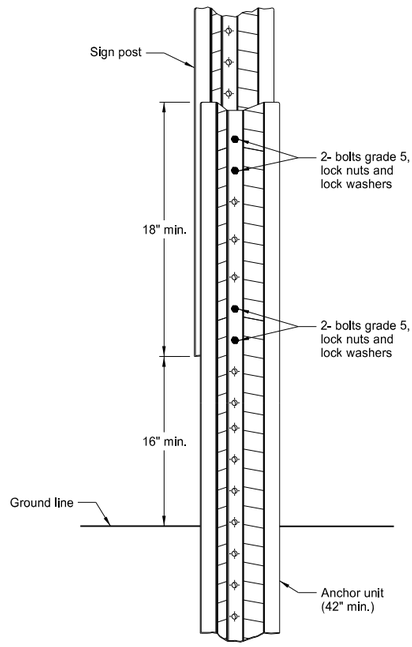



Retainer Strap Detail




Breakaway U-Channel Splice Detail
Alternate B
(2.5 and 3 lb/ft)

A maximum of 3 posts shall be installed within 7'.




Breakaway U-Channel Splice Detail
Alternate C
(2.5 and 3 lb/ft)

A maximum of 3 posts shall be installed within 7'.

Alternate A Steps of Installation:

1. a) Drive anchor unit to within 12" of ground level.
   b) Proper assembly established by lining up the bottom hole of retainer strap with the 6th hole from the top of the anchor unit.
   c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
   d) Rotate strap 90° to left.
2. a) Drive anchor unit to 4" above ground.
   b) Rotate strap to vertical position.
3. a) Place 5/16"x2" bolt, lock washer and nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit.
   b) Alternately tighten two connector bolts.
4. Complete assembly by tightening 5/16"x2" bolt (this fastens sign post to retainer strap).
5. The base post, strap and sign post shall be properly nested. Proper nesting occurs when all flat surfaces of the base post, strap, and sign post at the bolts have full contact across the entire width.

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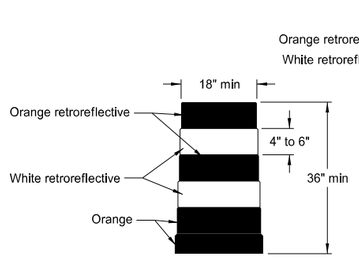
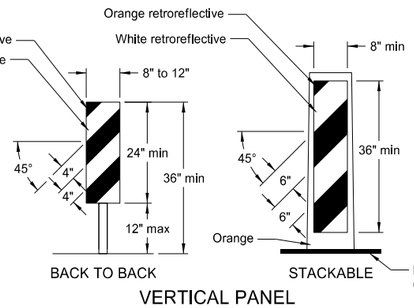
# BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



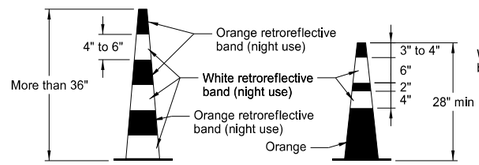

DELINEATOR DRUM

The markings on drums shall be horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide. Each drum shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectorized spaces between the horizontal orange and white stripes shall not exceed 3" wide. Stripes shall not be placed on ribs or indentations in the drum. Drums shall have closed tops that will not allow collection of construction debris or other debris. Ballast shall not be placed on the top of a drum.



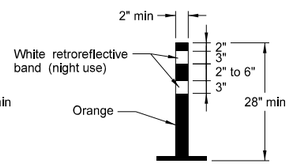

VERTICAL PANEL

Markings for vertical panels shall be alternating orange and white retroreflective stripes, sloping downward in the direction vehicular traffic is to pass. Retroreflective sheeting shall be placed on both sides of panel and shall have a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective material on the vertical panel is 36 inches or more, a stripe width of 6 inches shall be used.



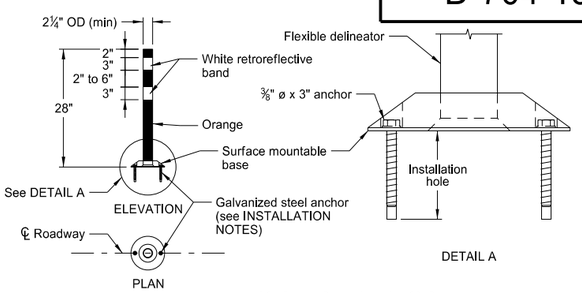

TRAFFIC CONE

Retroreflectorization of cones more than 36" in height shall be provided by alternating orange and white retroreflective stripes. Each cone shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectorized space between the orange and white stripes shall not exceed 3" wide.




TUBULAR MARKER

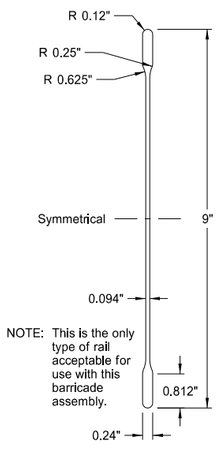
Retroreflectorization of tubular markers more than 42" in height shall be provided by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



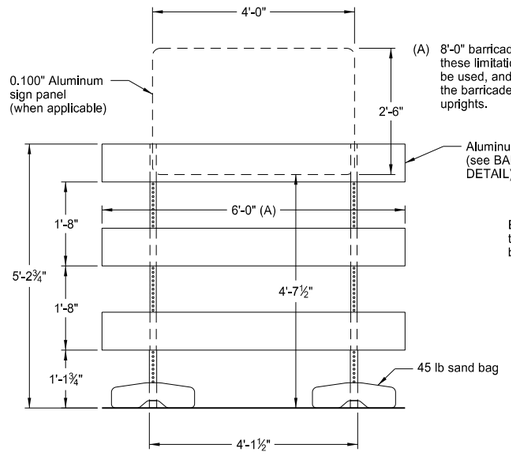

FLEXIBLE DELINEATOR

INSTALLATION NOTES:

1. Drill installation holes to diameter and depth as required by manufacturer's specifications.
2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
3. In lieu of bolted down base, the contractor may use an 8" x 8" butyl pad or hot melt butyl. Butyl shall be removed as close as possible to pavement surface.

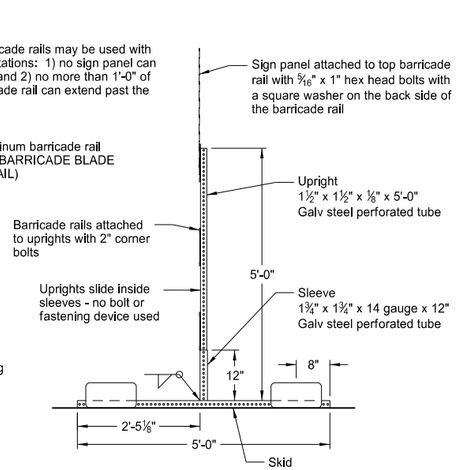



BARRICADE BLADE DETAIL



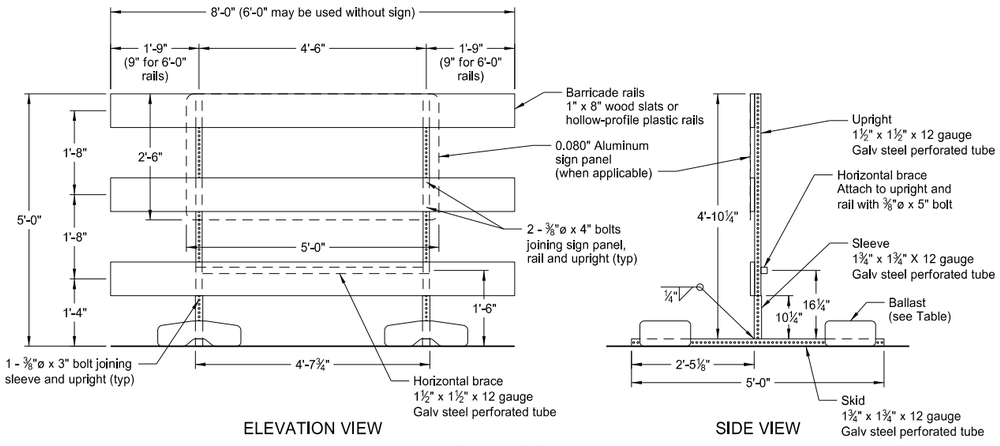

ELEVATION VIEW

(A) 8'-0" barricade rails may be used with these limitations: 1) no sign panel can be used, and 2) no more than 1'-0" of the barricade rail can extend past the uprights.




SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Aluminum Barricade Rails)

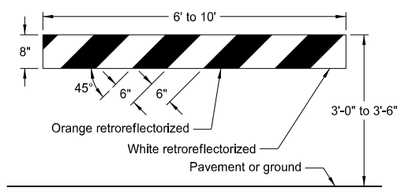



ELEVATION VIEW

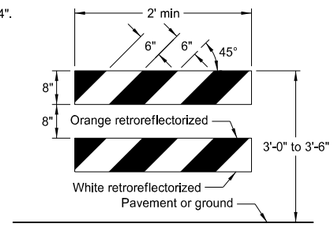
SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)

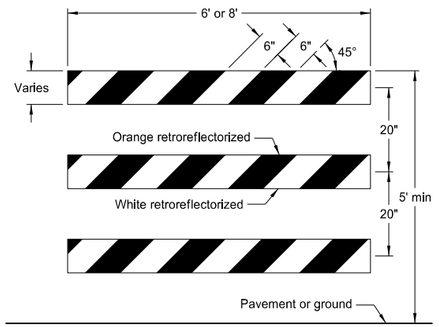
NOTE: Markings for barricades shall be alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Retroreflective sheeting shall be placed on both sides of the rails and shall have a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the barricade length is less than 36", the rail stripe width shall be 4".




TYPE I BARRICADE

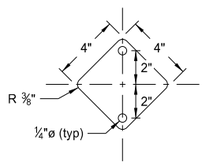


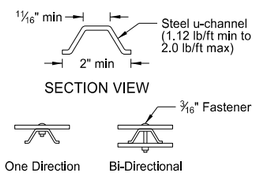

TYPE II BARRICADE

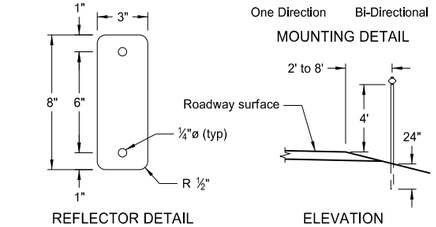



TYPE III BARRICADE

BARRICADE RAIL DETAILS




DELINEATORS

MINIMUM BALLAST
(For each side of barricade support)

| | |
|---|---|
| Without Sign | 4 - 25 lb sandbags |
| With Sign | 6 - 25 lb sandbags |

Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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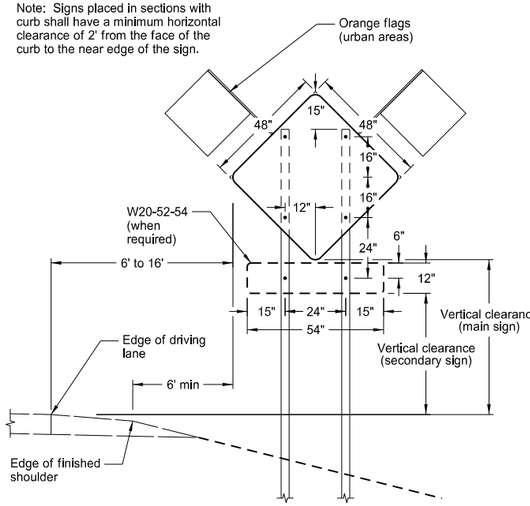
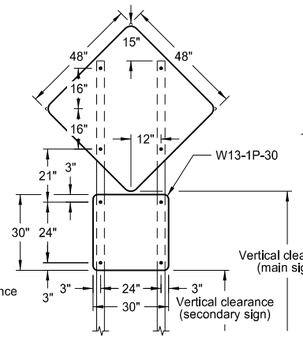
# CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

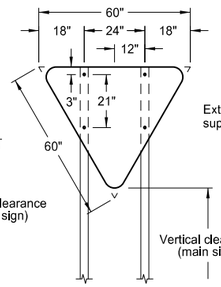
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



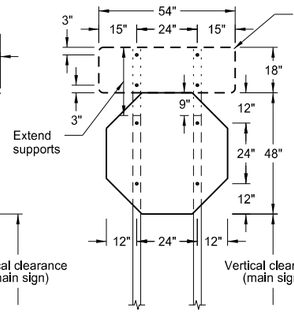

TYPICAL SECTION
(48" x 48" diamond warning sign shown)



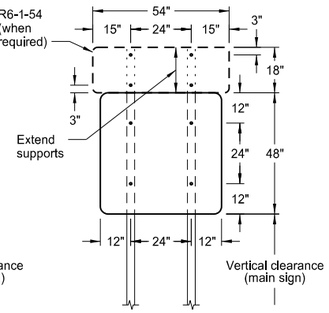

48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



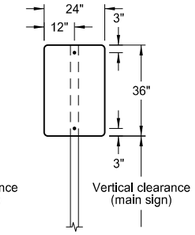

R1-2-60 - YIELD SIGN



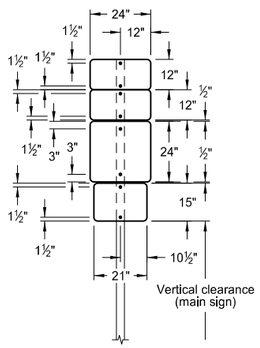

R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



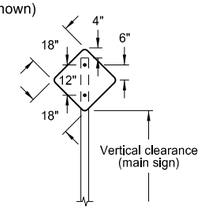

48" x 48" SIGN
(with R6-1-54 sign as required)



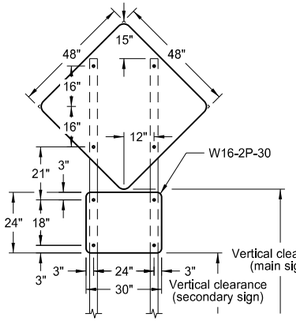

24" x 36" SIGN



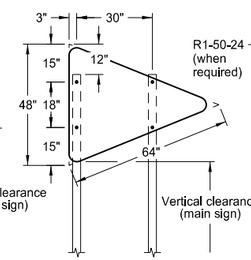

24" x 24"
ROUTE MARKER
ASSEMBLY



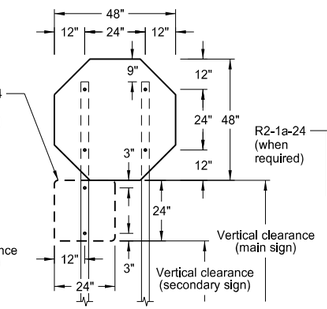

18" x 18"
DIAMOND SIGN



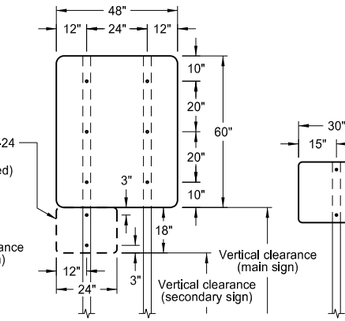

48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



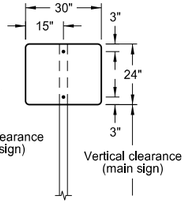

W14-3-64 - PENNANT SIGN



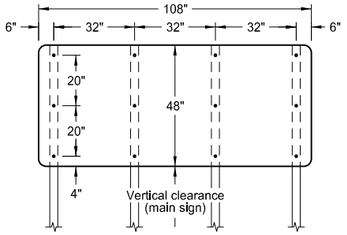

R1-1-48 - STOP SIGN
(with R1-50-24 sign as required)



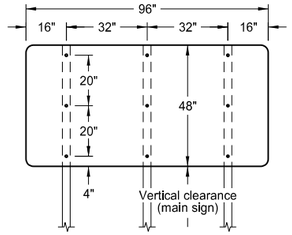

48" x 48" SIGN
(with R2-1a-24 sign as required)



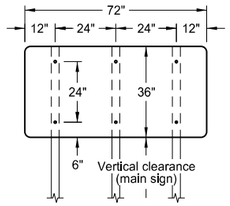

30" x 24" SIGN



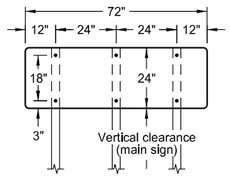

108" x 48" SIGN



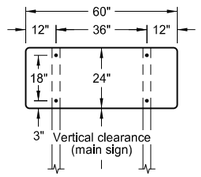

96" x 48" SIGN



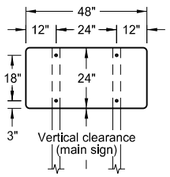

72" x 36" SIGN



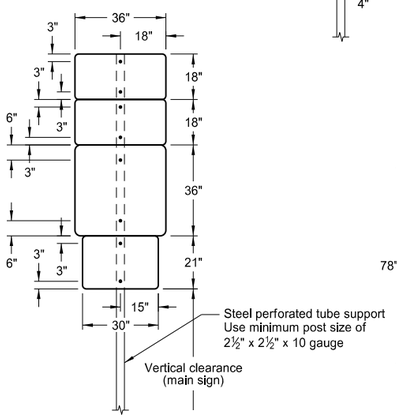

72" x 24" SIGN



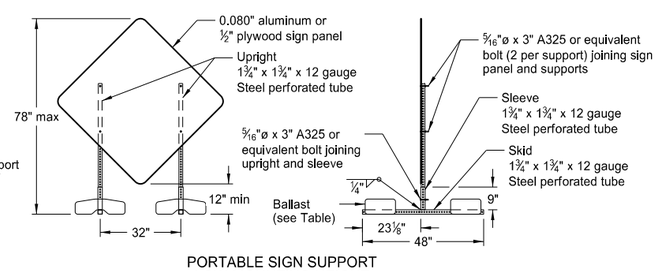

60" x 24" SIGN



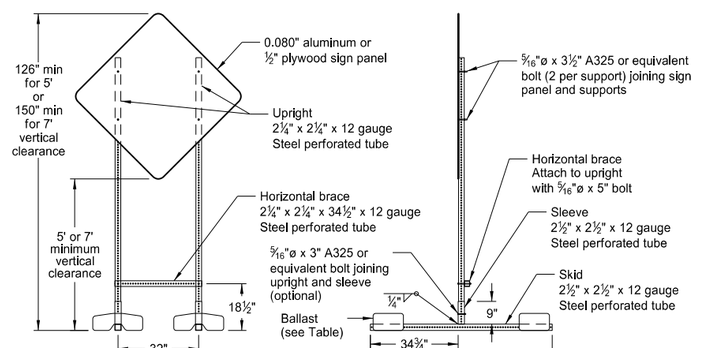

48" x 24" SIGN




36" x 36"
ROUTE MARKER
ASSEMBLY




PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT




PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

1. Sign Supports: Supports shall be galvanized or painted. Minimum post sizes are 2.5 lb/ft u-channel or 2" x 2" x 12 gauge steel perforated tube, except where noted. When installing signs on u-channel, the minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes are based on a wind speed of 55 MPH.

   Signs over 50 square feet should be installed on 2½" x 2½" perforated tube supports as a minimum.

   Guy wires shall not be attached to sign supports. Wind beams may be attached to u-posts behind the sign panels.

2. Sign Panels: Provide sign panels made of 0.100" aluminum, ½" plywood, or other approved material, except where noted. All holes to be punched round for ⅜" bolts.

3. Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a lane closure sign)

4. Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

   Interstate - white legend on blue background
   Interstate Business Loop - white legend on green background
   US and State - black legend on white background
   County - yellow legend on blue background

5. Vertical Clearance: Install signs with a vertical clearance of 5'-0" (see TYPICAL SECTION.) In areas where parking or pedestrian movements are likely or the view of the sign may be obstructed, install signs with a vertical clearance of 7'-0" from the top of the curb or from the near edge of the driving lane in absence of a curb.

   The vertical clearance to secondary signs is 1'-0" less than the vertical clearance as stated above.

   Large signs having an area exceeding 50 square feet shall have a minimum clearance of 7'-0" from the ground at the post.

6. Portable Signs: Provide portable signs that meet the vertical clearance as stated above. Use portable signs when it is necessary to place signs within the pavement surface.

   When portable signs are used for 5 days or less, low-mounting height (minimum 12" vertical clearance) sign supports may be used as long as the view of the sign is not obstructed. Time delays caused by unforseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period. The R9-8 through R9-11a series, W1-6 through W1-8 series, M4-10, and E5-1 may be used for longer than 5 days.

   Signs mounted to the portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT Details shall have a maximum surface area of 16 square feet.

MINIMUM BALLAST
(For each side of sign support base)

| Sign Panel Mounting Height (ft) | Number of 25 lb sandbags for 4' x 4' sign panel |
|---|---|
| 1' | 6 |
| 5' | 8 |
| 7' | 10 |

Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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| 11-14-13 | Revised Note 6. |

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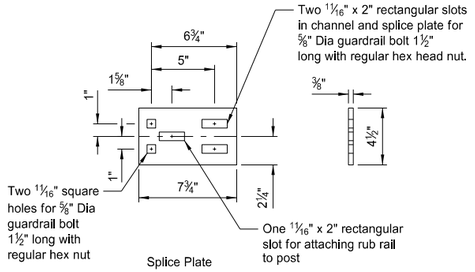
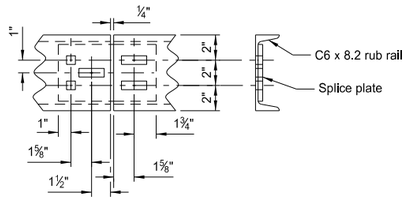
# W-BEAM GUARDRAIL GENERAL DETAILS

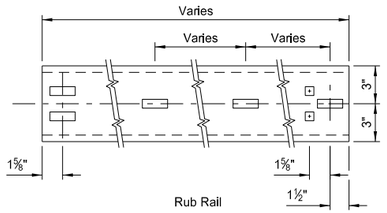
D-764-1




Splice Plate

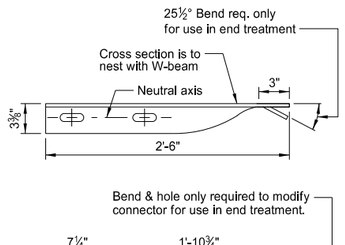



Splice Detail

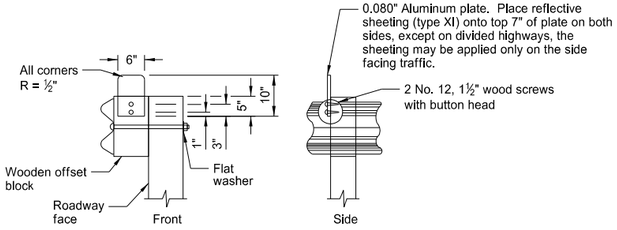



Rub Rail

## C6x8 RUB RAIL AND SPLICE PLATE

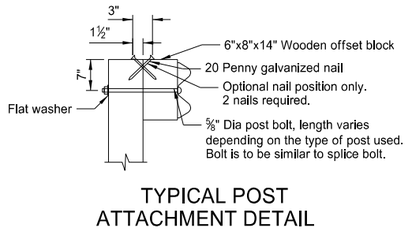



## W BEAM TERMINAL CONNECTOR

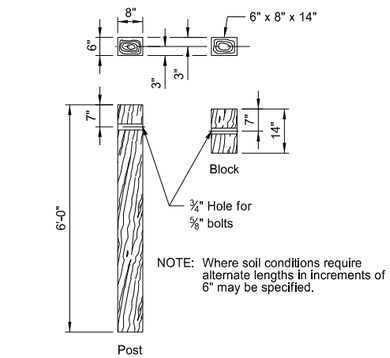



## REFLECTORIZED PLATE DETAIL

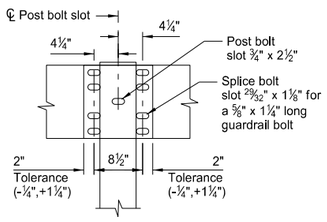
Additional reflectors are added to the W-beam guardrail quantities for placement on end treatment.



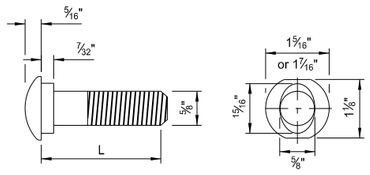

## TYPICAL POST ATTACHMENT DETAIL



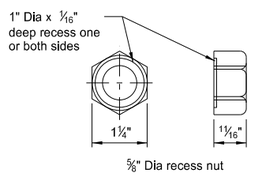

## 6"x8" TIMBER POST & BLOCK



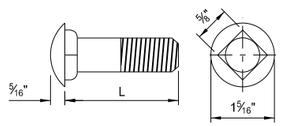

## SPLICE DETAIL




| 5/8" Diameter Guardrail Bolt | |
|---|---|
| L | Thread Length |
| 1 1/4" | Full length thread |
| 2" | 1 3/4" Min thread length |
| 9 1/2" | 4" Min thread length |
| 18" | 4" Min thread length |
| 20" | 4" Min thread length |
| 22" | 4" Min thread length |
| 25" | 4" Min thread length |

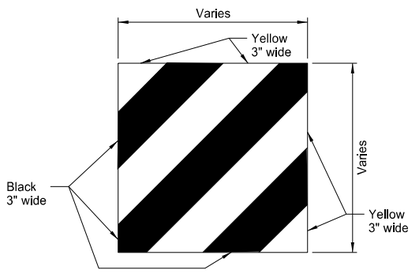



## 5/8" GUARDRAIL BOLT & RECESS NUT

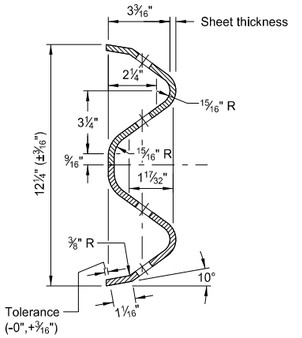



| 5/8" Diameter Carriage Bolt | |
|---|---|
| L | Thread Length |
| 1 1/2" | Full length thread |
| 3" | 1 1/2" Min thread length |
| 11" | 1 3/4" Min thread length |
| 13" | 1 3/4" Min thread length |


## 5/8" CARRIAGE BOLT & NUT




## IMPACT HEAD OBJECT MARKER




## W-BEAM CROSS SECTION

NOTES:

1. Reflectorized plates: Reflector plates shall begin at the first post and be spaced at 25' centers on guardrail less than 250' in length and at 50' centers for guardrail over 250' in length. The reflector shall be the same color as the pavement marking adjacent to that reflector unless noted otherwise on the plans.
2. Manner of replacing bituminous material at guardrail post: All excess earth from excavations for guard posts shall be disposed of as directed by the engineer. Replace bituminous material wherever guardrail is installed after mat has been laid. Cost of excavation and replacing of bituminous material to be included in the price bid for other items.
3. The Object Marker shall fit within the vertical edges of the Impact Plate. The retroreflective sheeting shall be type XI sheeting meeting the requirements of Section 894.02.B of the standard specifications. The sheeting shall be applied to 0.100 Aluminum sheeting meeting the requirements Section 894.01.A. The Object Marker shall attach to the Impact Head Plate with rivets or some other attachment device. The rivets or attachment device shall be non-rust. The stripes shall slope downward toward the roadway side.
4. Guardrail installation height tolerance = - 1/4" , + 1".

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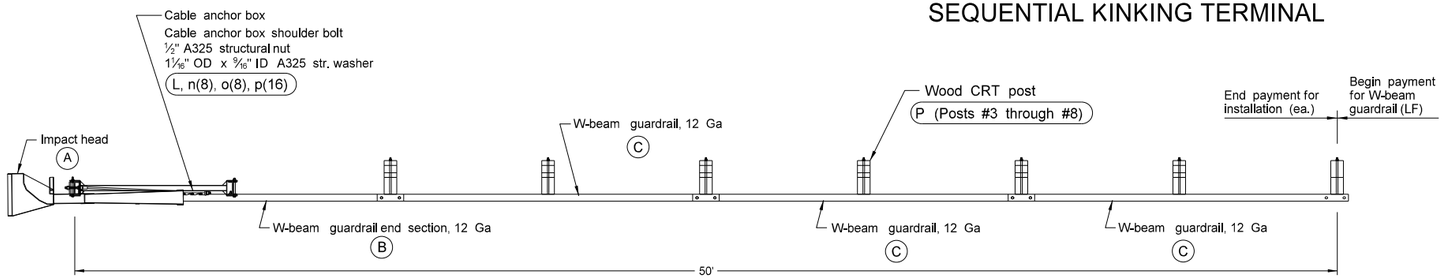
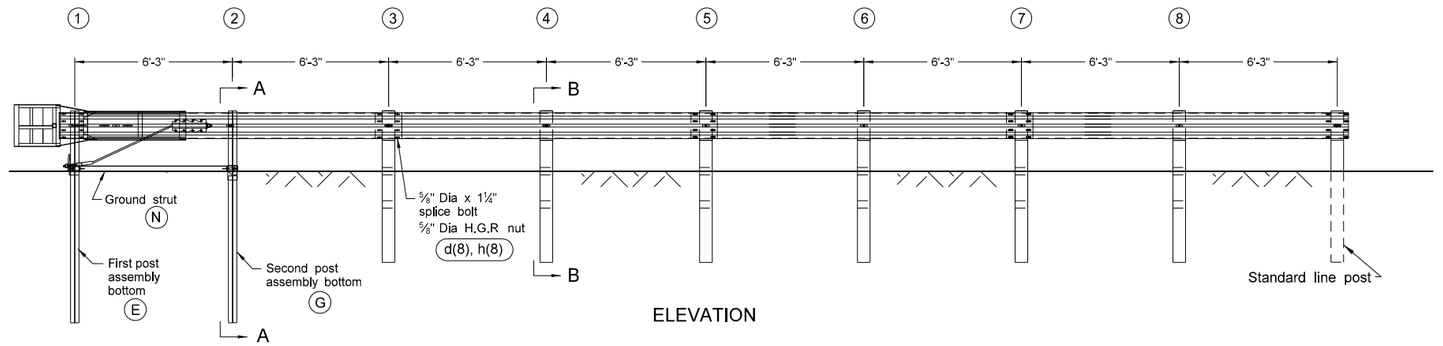
# SEQUENTIAL KINKING TERMINAL

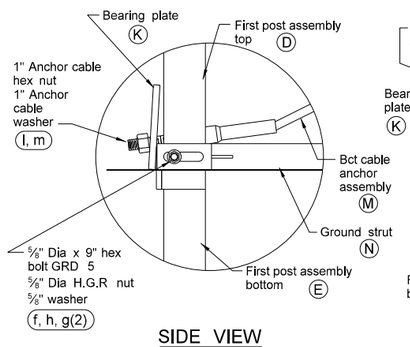
D-764-5



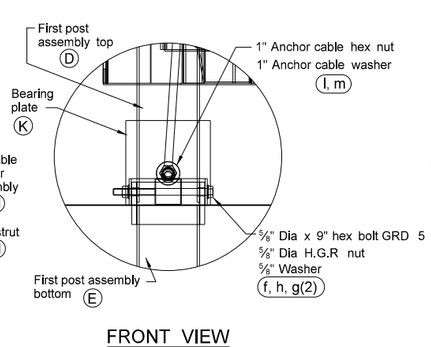

PLAN




ELEVATION

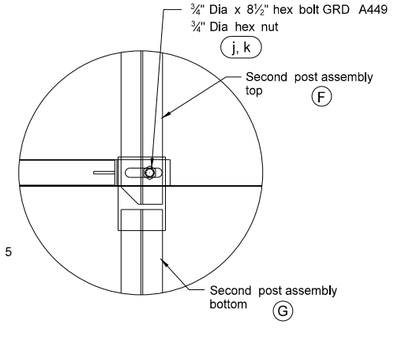



SIDE VIEW

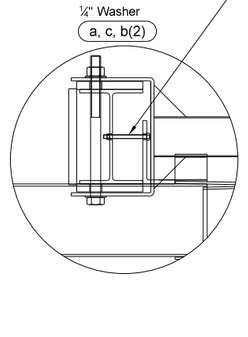



FRONT VIEW

POST #1 CONNECTION DETAILS




SIDE VIEW DETAIL OF POST #2

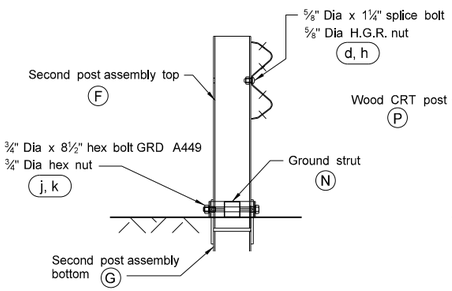



IMPACT HEAD CONNECTION DETAIL

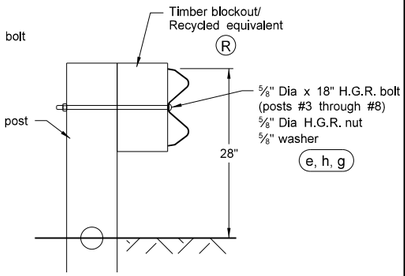
GENERAL NOTES:

1. Breakaway posts are required with the SKT.
2. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
3. The SKT can be flared at a rate of up to 25:1 to prevent the impact head from encroaching on the shoulder.
4. The lower sections of the posts shall not protrude more than 4" above the ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
5. The lower section of the hinged posts should not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
6. When rock is encountered, a 10" diameter post hole, 20" into the rock surface may be used if approved by the engineer. Granular material will be placed in the bottom of the hole, approximately 2 1/2" deep to provide drainage. Posts 1 & 2 can be field cut to length, placed in the hole and backfilled with adequately compacted material excavated from the hole.
7. The breakaway cable assembly must be taut. A locking device (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.
8. The wood blockouts on post #3 through post #8 should be "toe nailed" with two 20 penny galvanized nails into each rectangular post, to prevent them from turning when the wood shrinks.

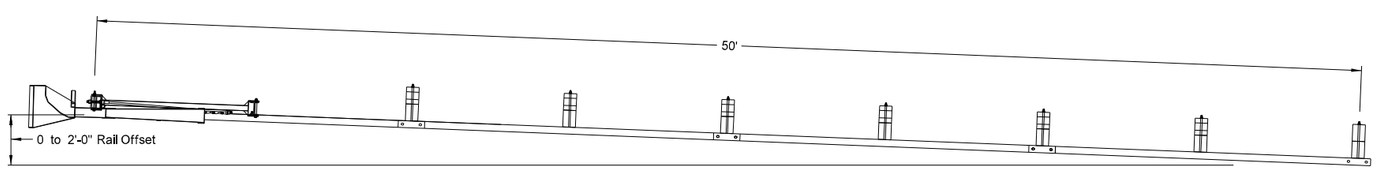
| ITEM | QTY | BILL OF MATERIALS |
|---|---|---|
| A | 1 | IMPACT HEAD |
| B | 1 | W-BEAM GUARDRAIL END SECTION, 12 Ga |
| C | 3 | W-BEAM GUARDRAIL, 12 Ga |
| D | 1 | FIRST POST ASSEMBLY TOP |
| E | 1 | FIRST POST ASSEMBLY BOTTOM |
| F | 1 | SECOND POST ASSEMBLY TOP |
| G | 1 | SECOND POST ASSEMBLY BOTTOM |
| K | 1 | BEARING PLATE |
| L | 1 | CABLE ANCHOR BOX |
| M | 1 | BCT CABLE ANCHOR ASSEMBLY |
| N | 1 | GROUND STRUT HINGED POST |
| P | 6 | WOOD CRT POST |
| R | 6 | TIMBER BLOCKOUT/RCY EQUIVALENT |
| | | HARDWARE |
| a | 2 | ¼" x 4" HEX BOLT Grade 5 |
| b | 4 | ¼" WASHER |
| c | 2 | ¼" HEX NUT |
| d | 25 | ⅝" Dia x 1¼" SPLICE BOLT, POST #2 |
| e | 6 | ⅝" Dia x 18" H.G.R. BOLT (POSTS 3 THRU 8) |
| f | 1 | ⅝" Dia x 9" HEX BOLT GRD 5 |
| g | 8 | ⅝" WASHER |
| h | 32 | ⅝" Dia H.G.R NUT |
| j | 1 | ¾" Dia x 8½" HEX BOLT GRD A449 |
| k | 1 | ¾" Dia HEX NUT |
| l | 2 | 1" ANCHOR CABLE HEX NUT |
| m | 2 | 1" ANCHOR CABLE WASHER |
| n | 8 | CABLE ANCHOR BOX SHOULDER BOLT |
| o | 8 | ½" A325 STRUCTURAL NUT |
| p | 16 | 1⅛" OD x ⅝" ID A325 STR. WASHER |




SECTION A-A
Post #2




SECTION B-B
Posts #3 through #8




FLARED INSTALLATION
25:1 maximum flare rate

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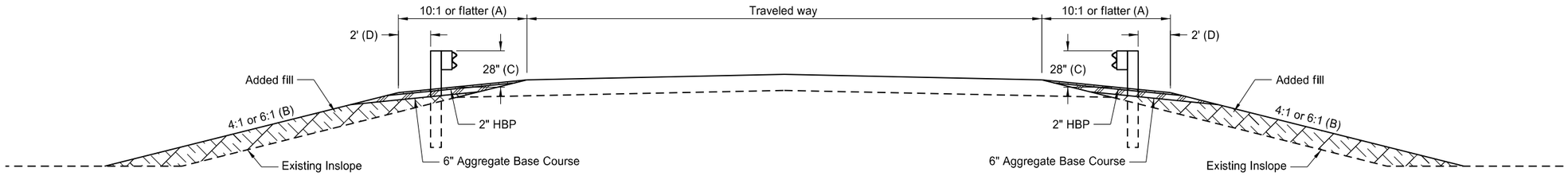
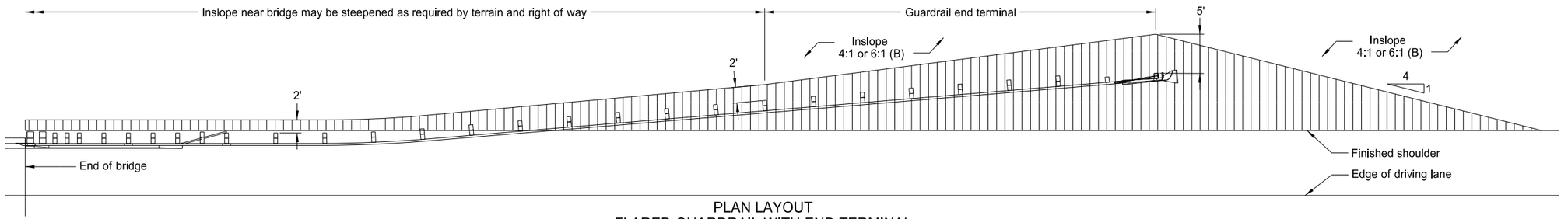
D-764-22

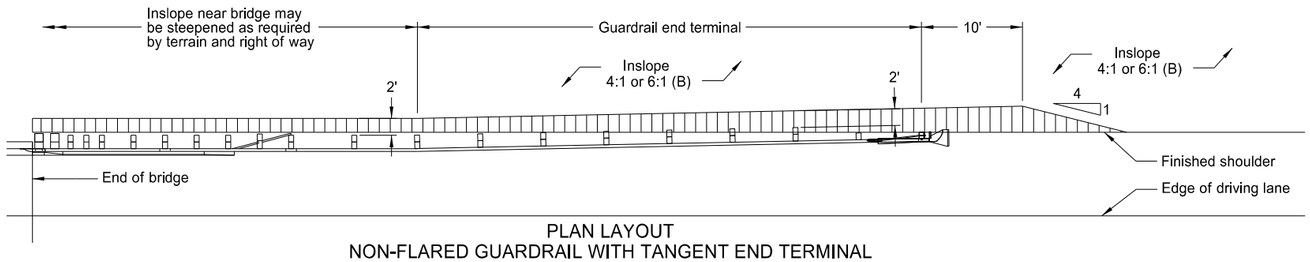
# TYPICAL GRADING AT BRIDGE ENDS WITH W-BEAM GUARDRAIL



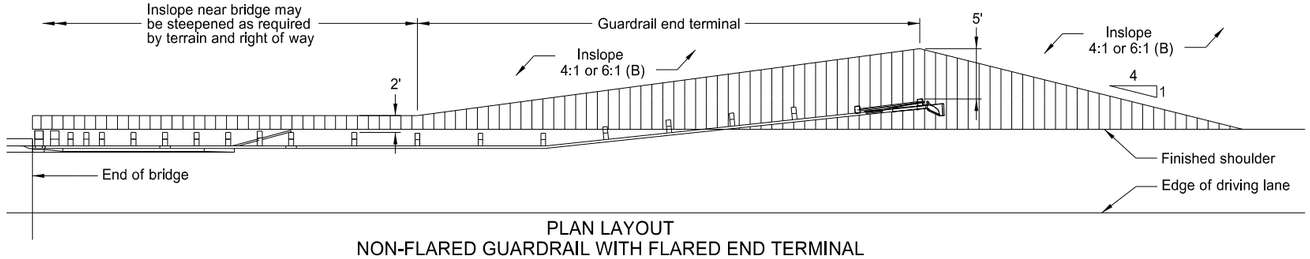

TYPICAL SECTION




PLAN LAYOUT
FLARED GUARDRAIL WITH END TERMINAL




PLAN LAYOUT
NON-FLARED GUARDRAIL WITH TANGENT END TERMINAL




PLAN LAYOUT
NON-FLARED GUARDRAIL WITH FLARED END TERMINAL

NOTES:

(A) Slope flatter than 10:1 may be required to provide proper guardrail height.

(B) Where normal inslope is 4:1 the added fill shall be 4:1. Where normal inslope is 6:1 the added fill shall be 6:1.

(C) Measured from top of guardrail to top of surfacing at front face of guardrail.

(D) Dimension at end terminals may vary per Plan Layouts shown on this sheet.

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